FOUNDRY
EST. 1902 TRADE JOURNAL
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No. 2312 MARCH 30, 1961
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Serfco customers have at their disposal all the backing and benefit of the independently operated Darwen After-Sales Technical Service.

To meet the needs of our customers, we are continuing to produce half briquettes of Serfco alloy additions, as well as full size briquettes. Moreover, the new method of manufacture now being used enables us to offer half briquettes at the same price per ton as the full size briquettes.

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Union Carbide* new briquettes

The new Union Carbide briquettes mean advantages all round for ferro alloy users—advantages in cost, convenience and consistency.

new lower prices

The new shape and method of packing have cut our production costs and we have passed the savings on to you. If you are a tonnage customer you save even more!

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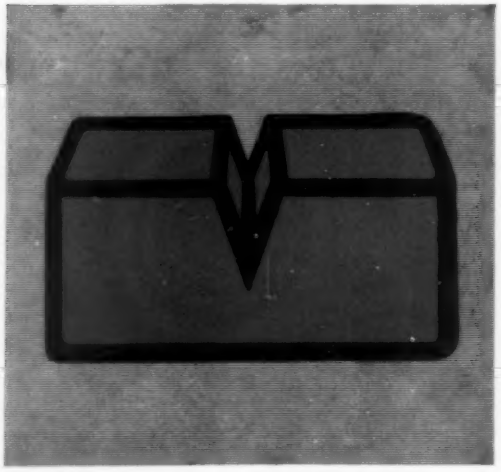

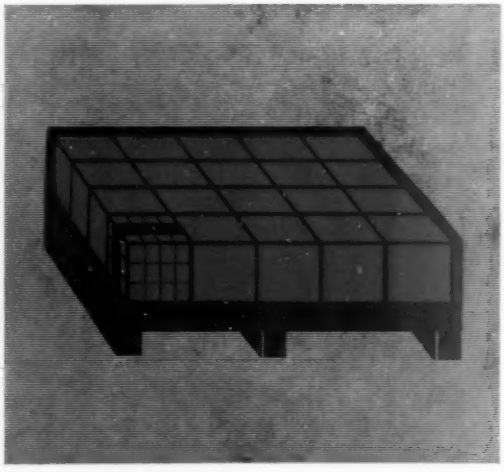

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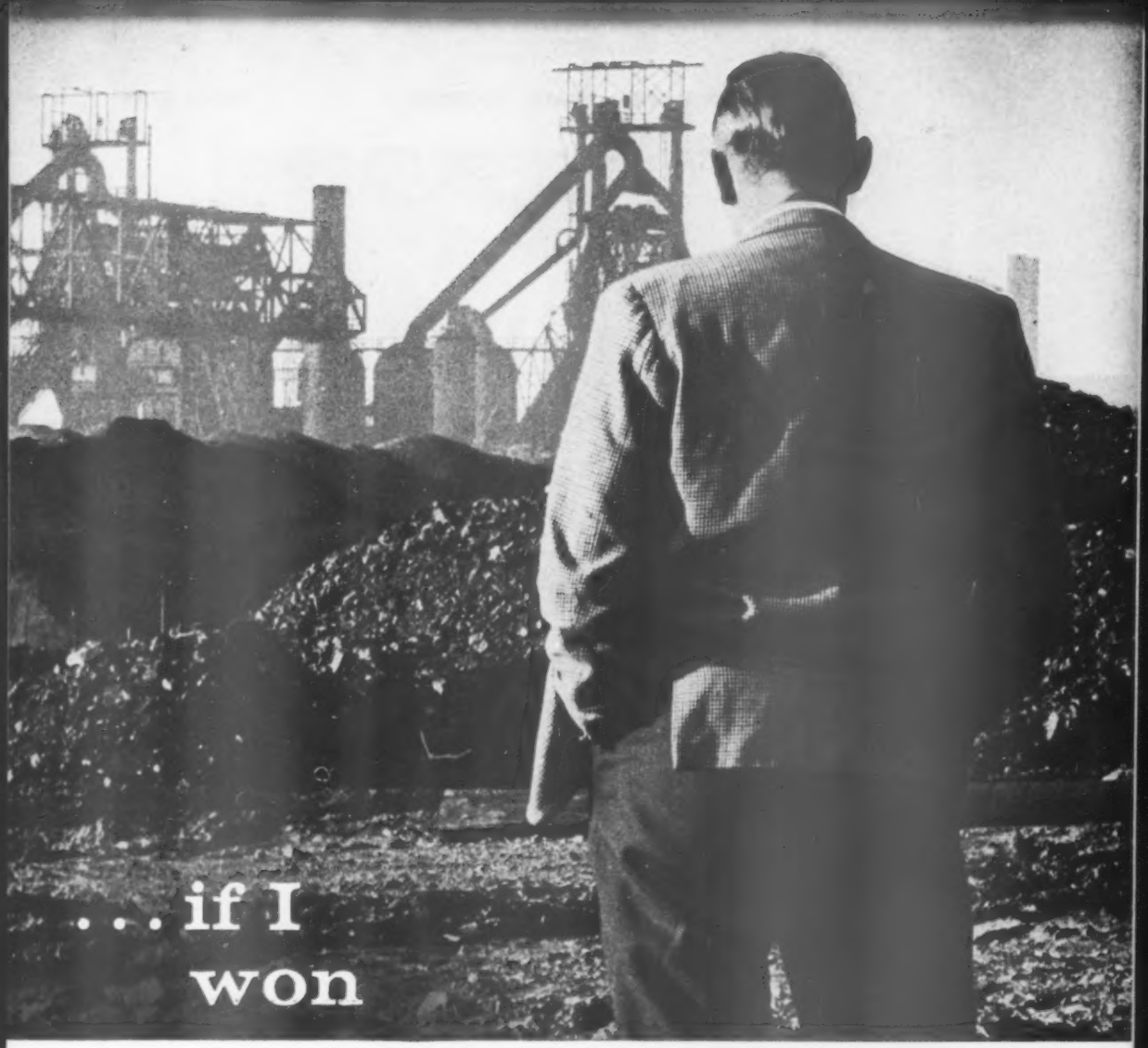

the pools

". . . and I might at that if a couple of teams I could mention were to buy themselves some decent centre forwards.

"Football is a funny game. One week a club is a world-beater and yet a few days later they can be licked to a frazzle by a team from a girls' school.

"Heaven help us if we carried on that sort of caper at AW. Customers don't want firms that are up one minute and down the next. When buyers come to a company with our reputation they expect—and get—a reliable performance. Fancy telling them that a load of pig wasn't up to specification because one of our furnacemen was off form!

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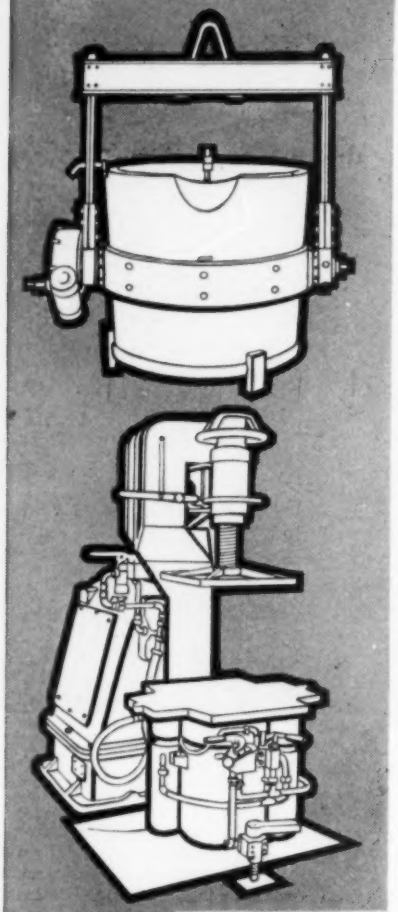

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LINSLADE No. 1 SAND SLINGER, 10ft. radius by Foundry Equipment Co.

AUGUST No. 3 SAND MILL, pan 8ft. dia. by 4ft. deep, cap. 10/15 ton/hr.

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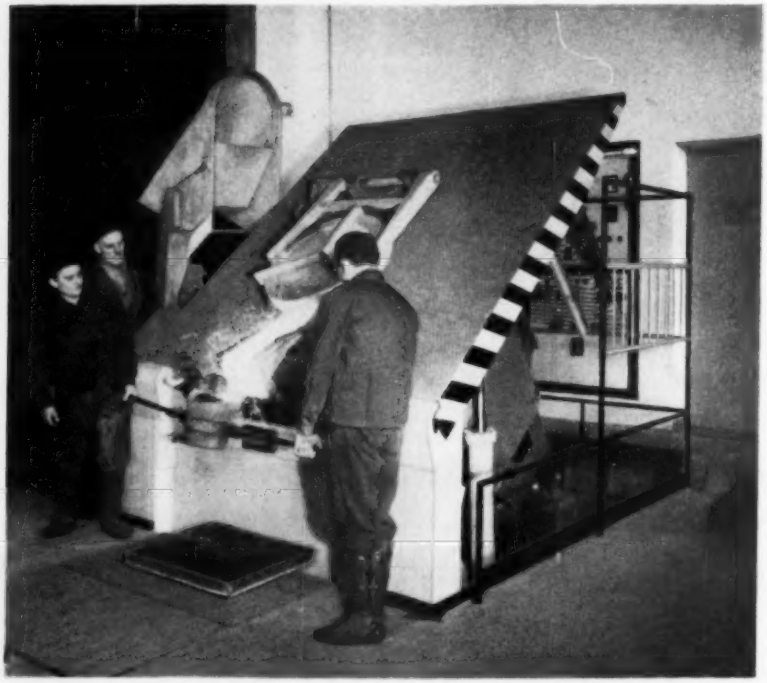
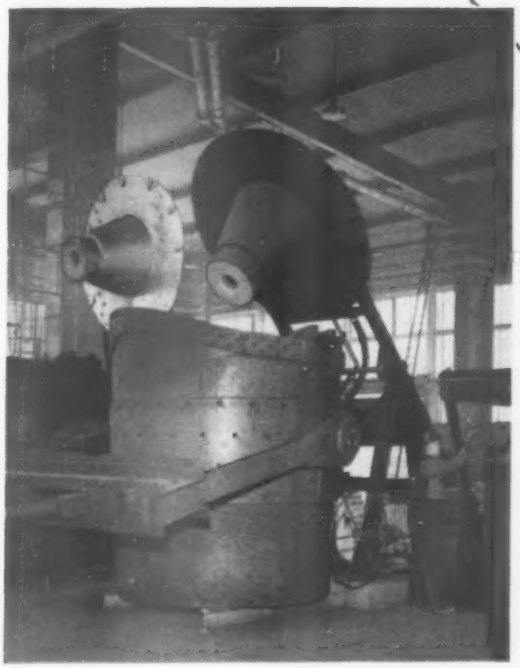
The illustration shows a Coreless Furnace (Reference "CSA") of 1½ tons capacity, with a rating of 300 KVA.



"VORTEX" Ladle Dryers



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Replica of master pattern, 6 ft long, for a diagonal brace of a Caterpillar D8 Tractor. Cast in Araldite by Wilkinson & Co. Ltd, Bilston, for F. H. Lloyd & Co. Ltd, Wednesbury, suppliers of castings to Caterpillar Tractor Co. Ltd, Glasgow.

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2 Cores are prevented from sagging and, if necessary, can be stripped from their boxes before gassing.

3 Some of the free water in the sodium silicate is absorbed, neutralising the stickiness of the sand. Sands will, therefore, have cleaner and smoother stripping properties and patching up, if required, is made easier.

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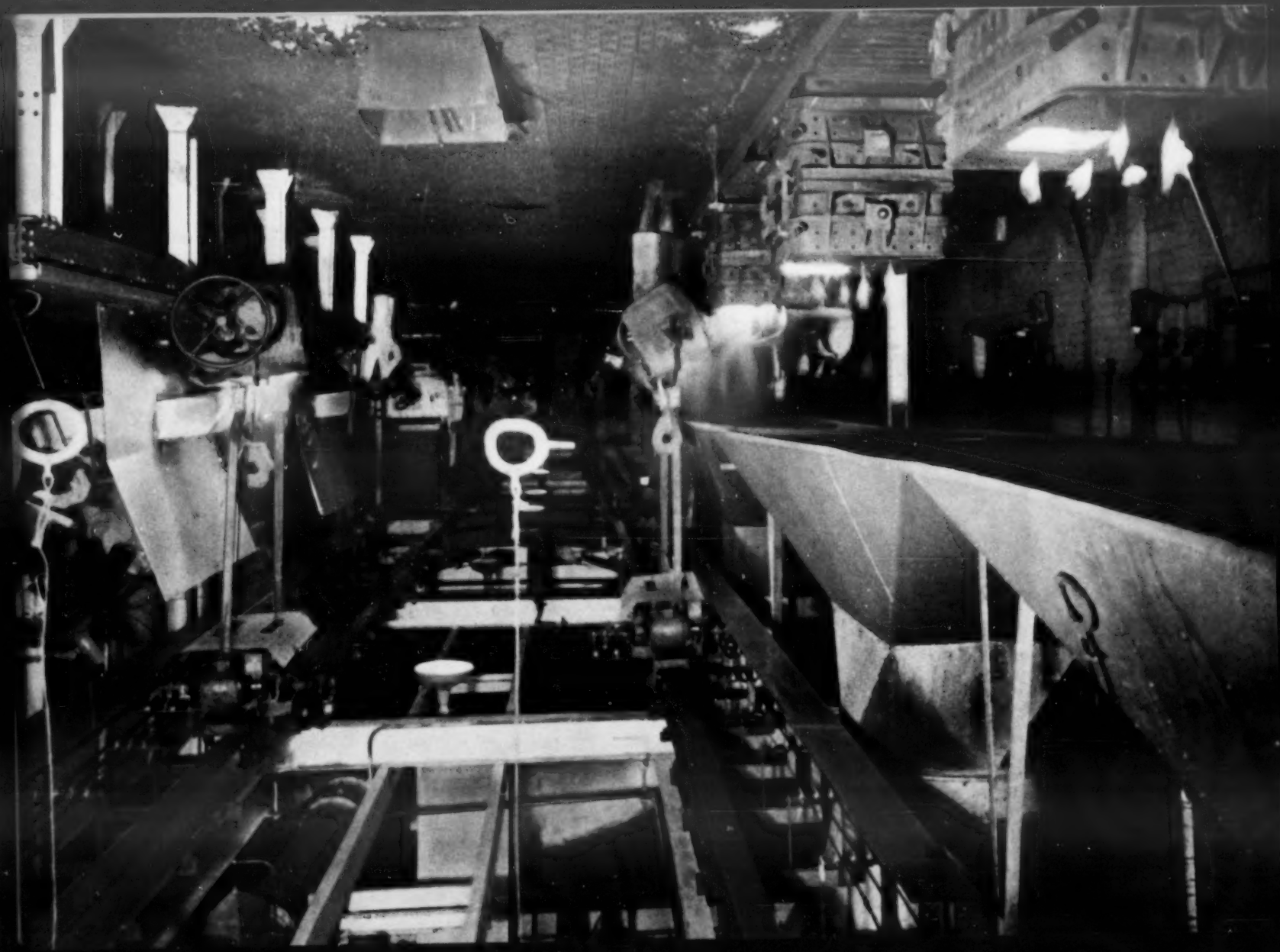
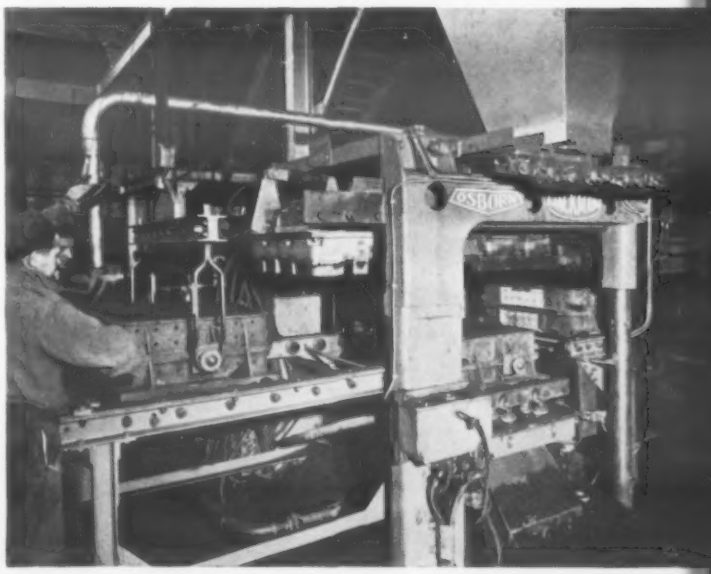
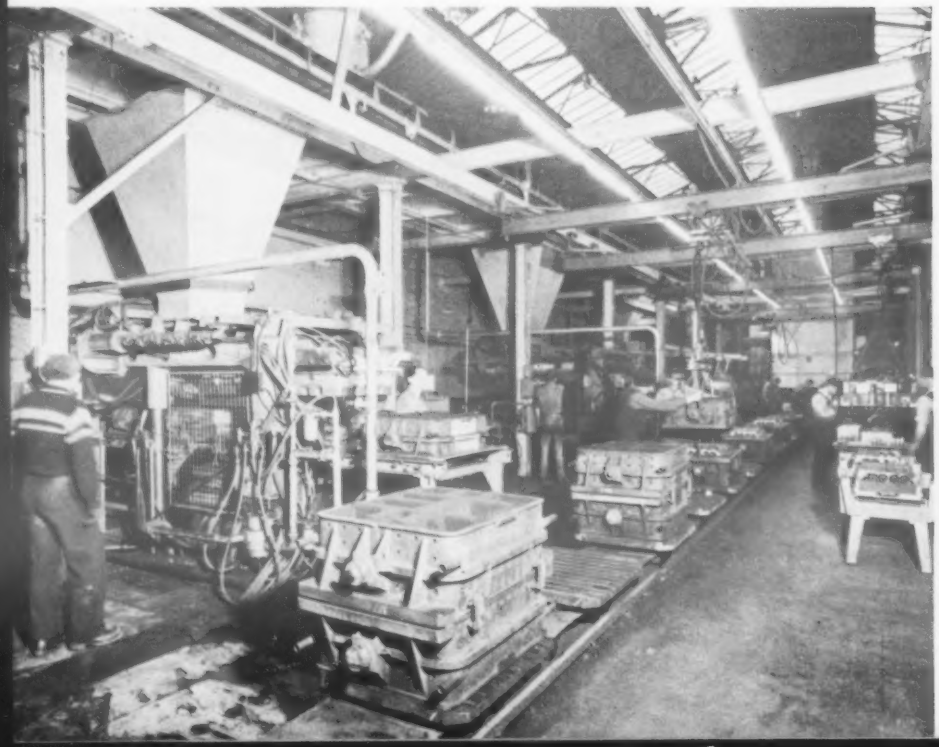


Sterling boxes help to build BMC parts at Wellingborough

614 Cogent

Sterling boxes are used in conjunction with these new semi-automatic machines recently installed at Messrs Morris Engines Foundry at Wellingborough. The machines are capable of an output of sixty complete moulds per hour, and the boxes used are of the famous Sterling heavy duty type designed to resist very high moulding pressures and stresses, and ideal for operating in mechanised foundries.





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ACME Companies

"The Air Tumbler"

British Patent No. 629292

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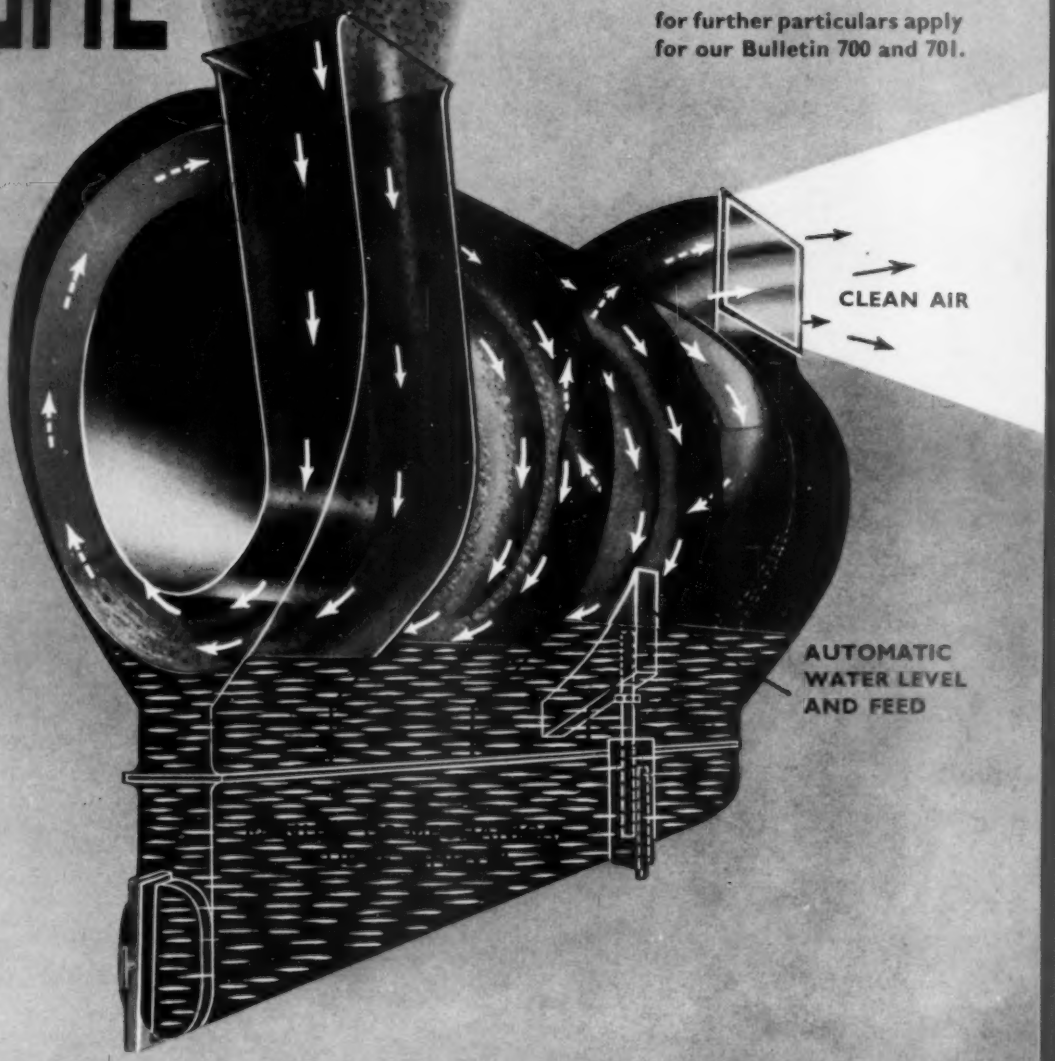
for further particulars apply
for our Bulletin 700 and 701.



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John Thompson Cupola Meters can do the same for you.

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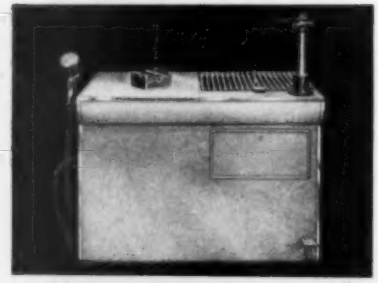
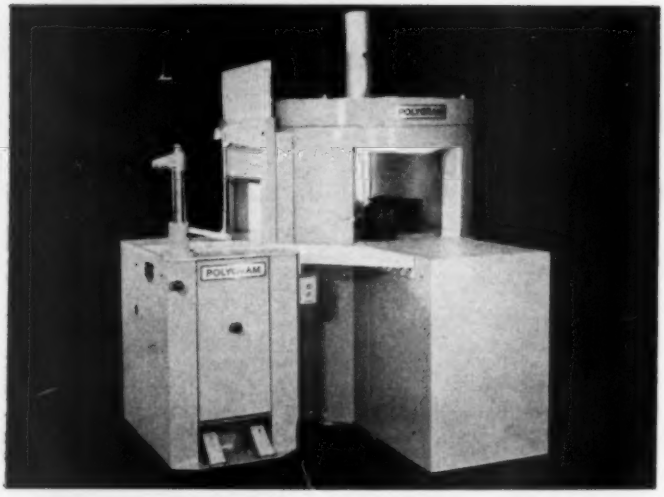


BETTER FOR 1954!!



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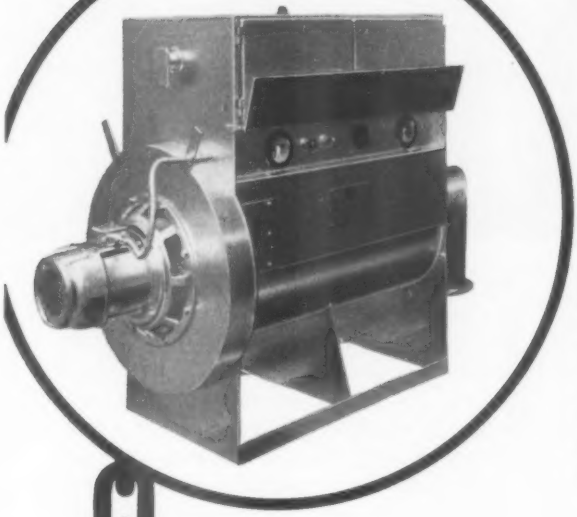

. . . designed for drying floor moulds or large box moulds for ferrous and non-ferrous metal castings. They operate by forcing hot air over the mould surface and through the sand giving quicker and more efficient drying than is normally achieved by other methods. Using air temperatures lower than hot gases, and less than one third the quantity of heat, they reduce drying times by half. Heating is uniform throughout the mould and despite rapid drying, surfaces remain free from cracks and cleaner castings are produced.

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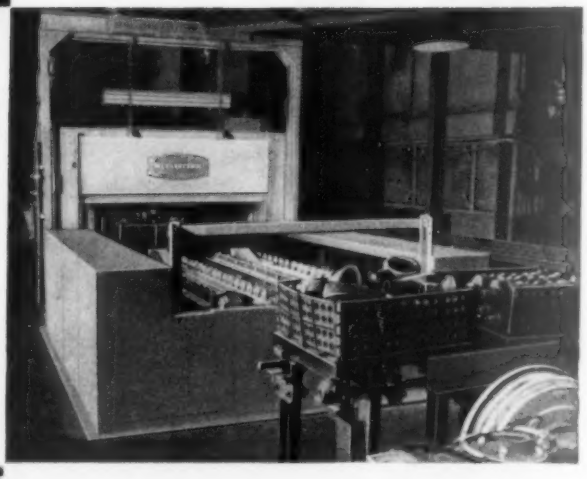

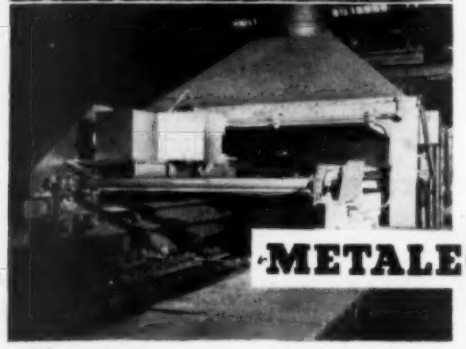

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Manufactured by

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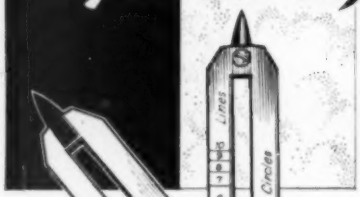

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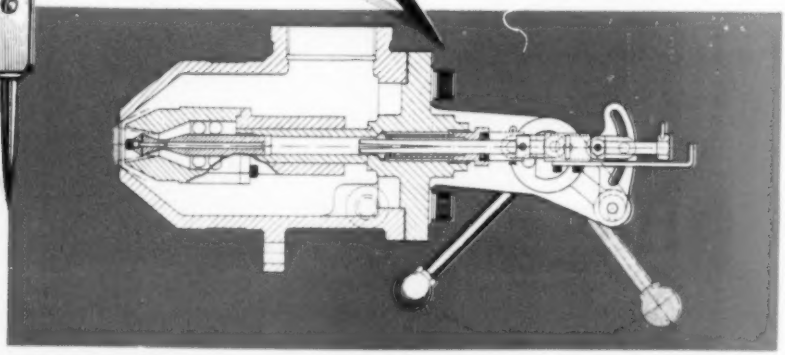

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	Manganese	0·7—1·1%
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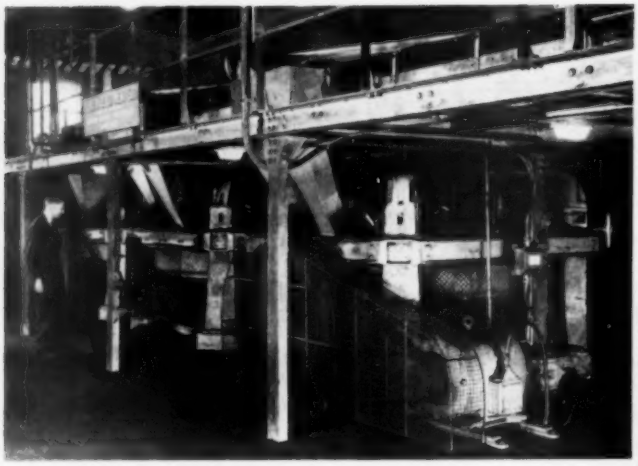

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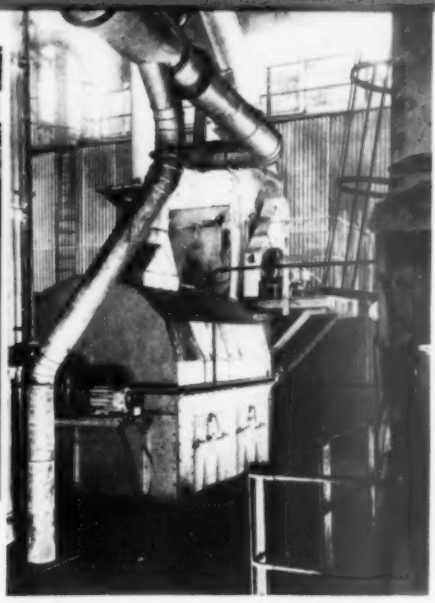

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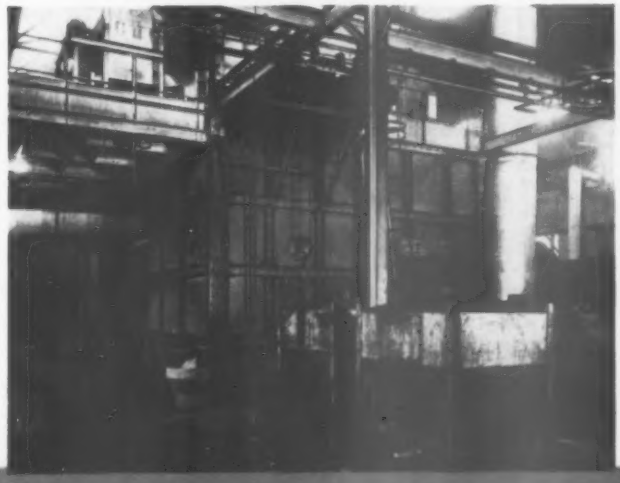

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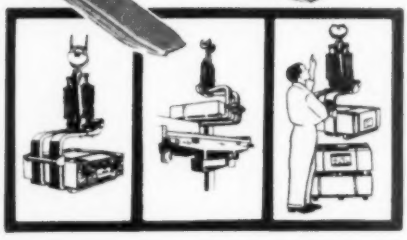

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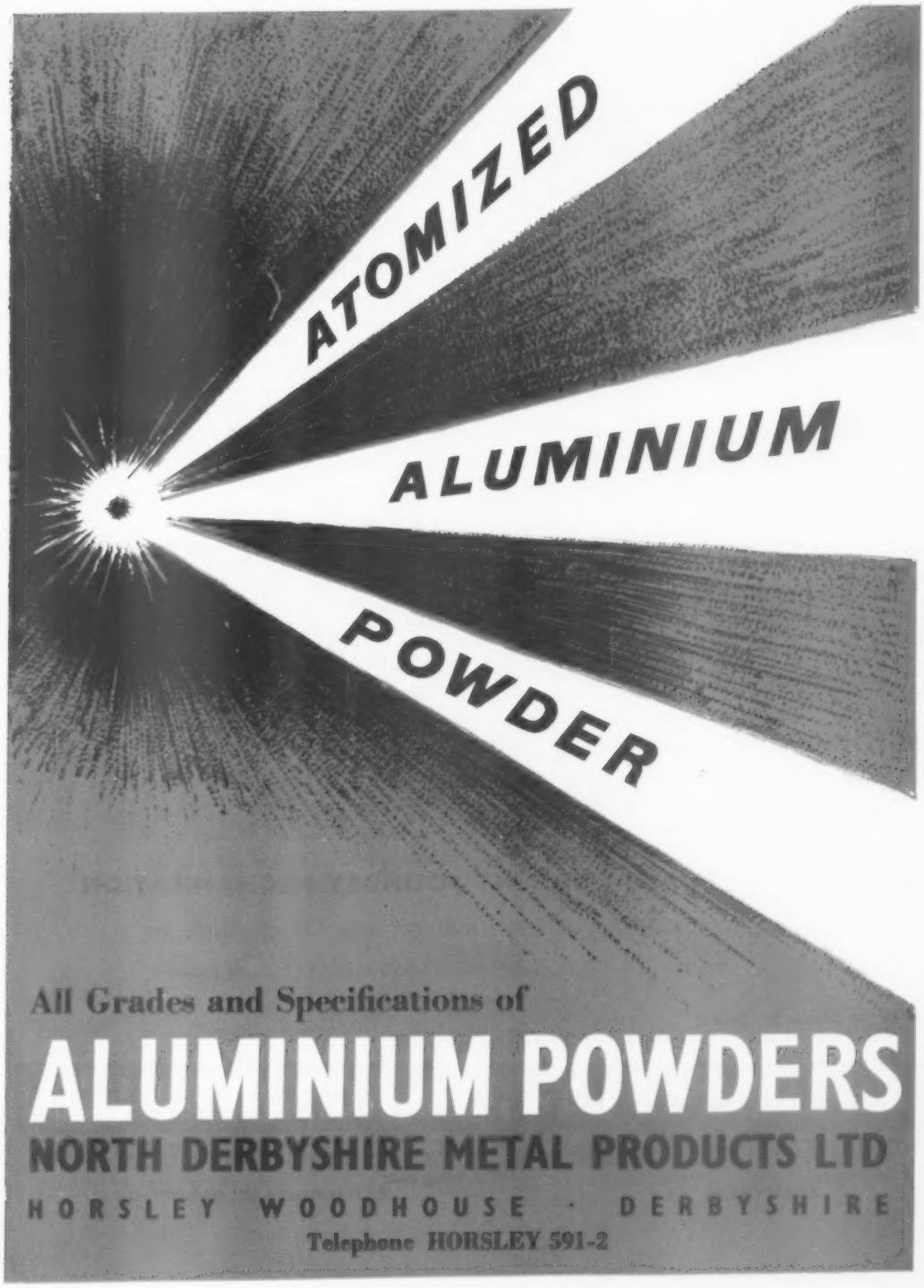
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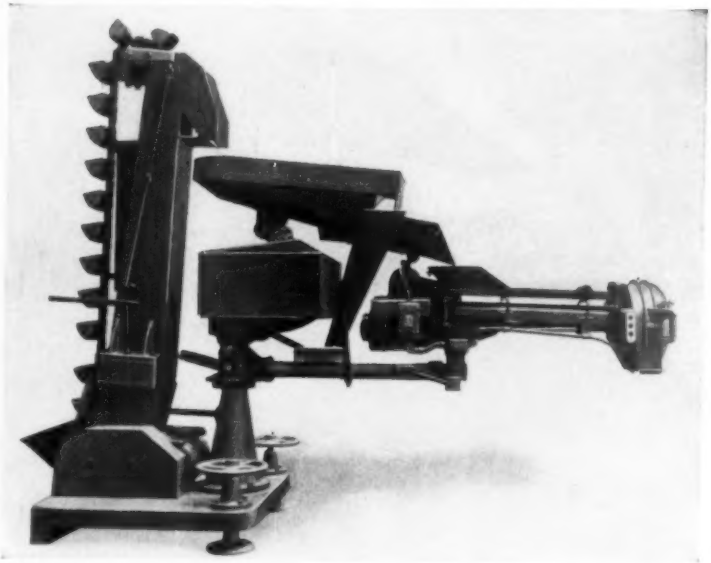

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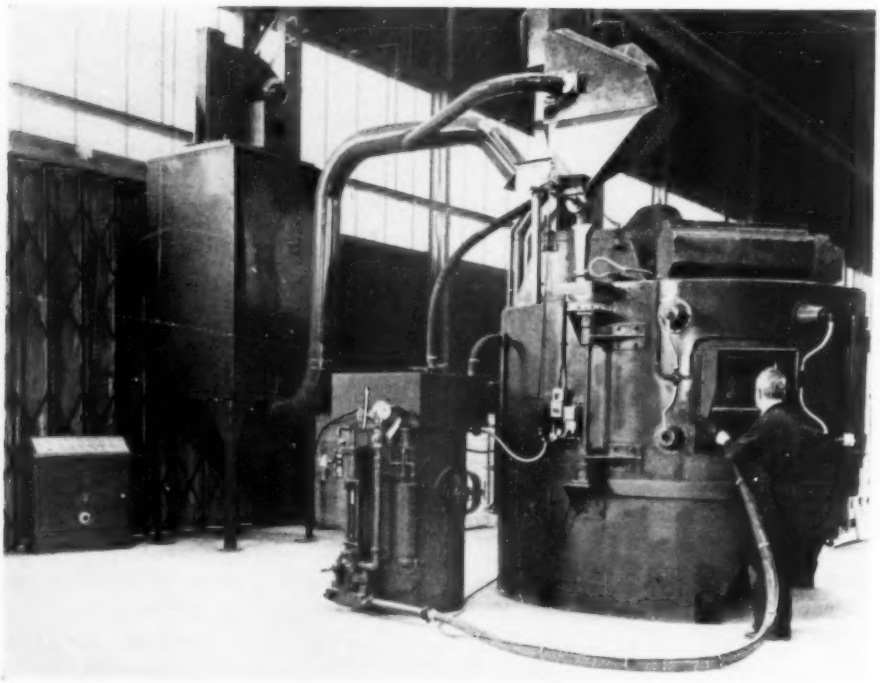

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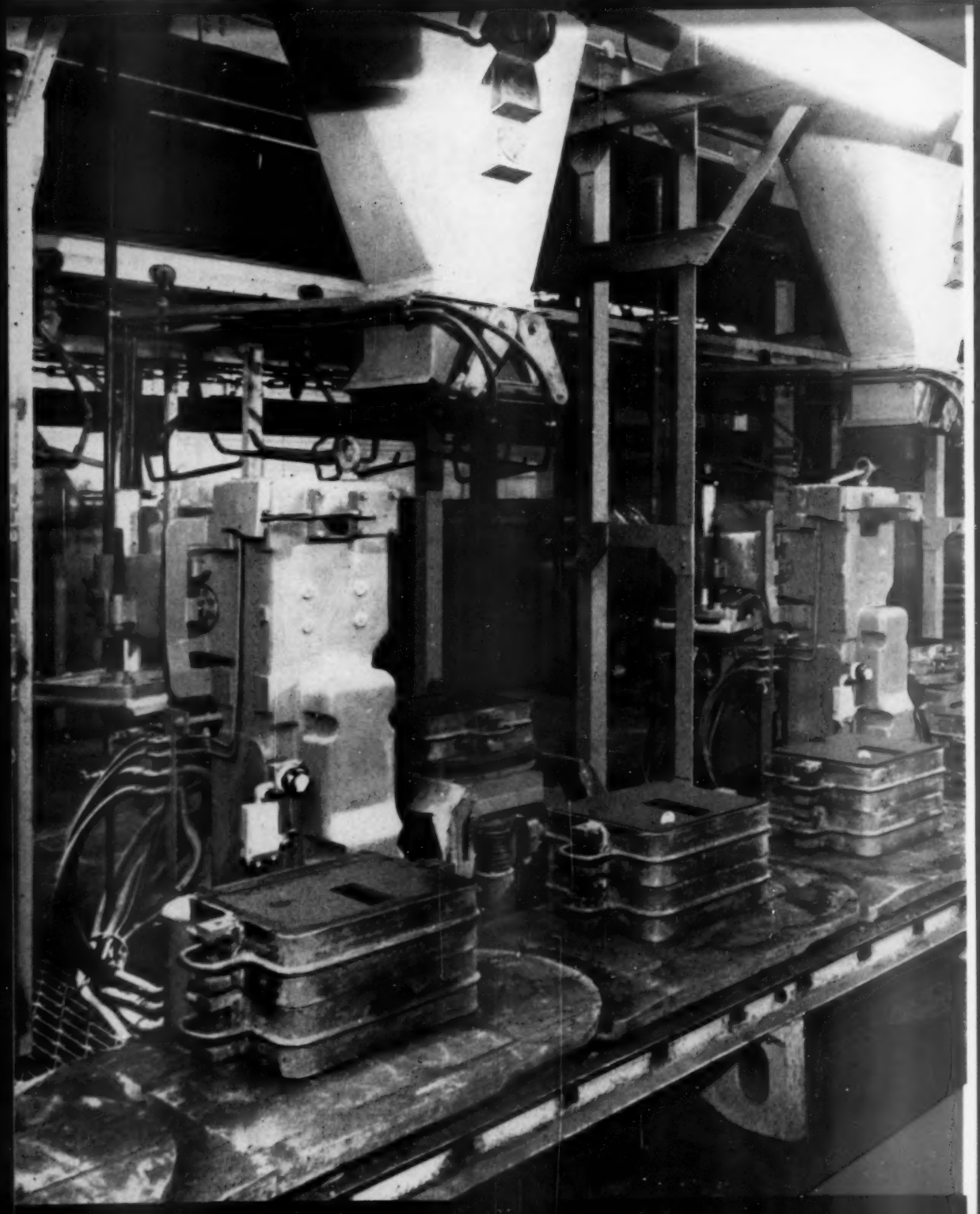

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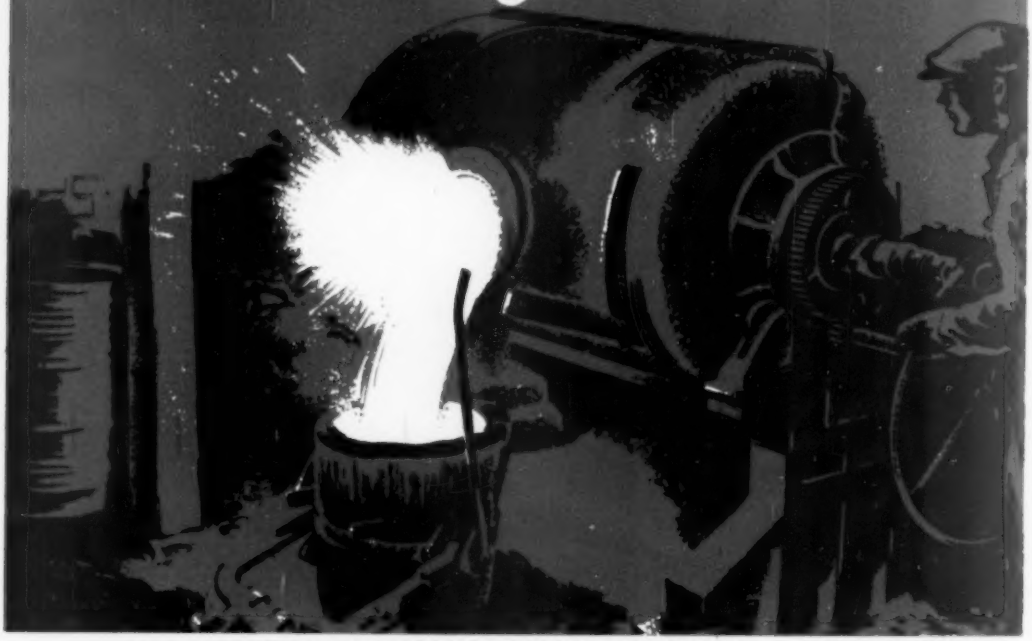

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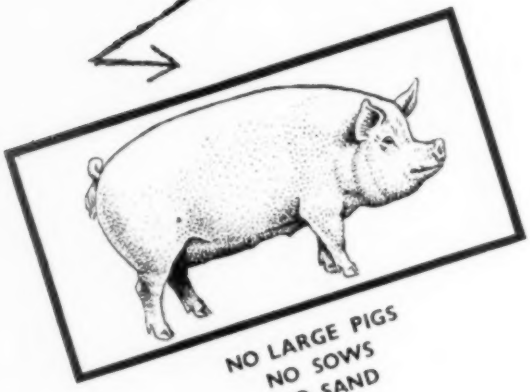

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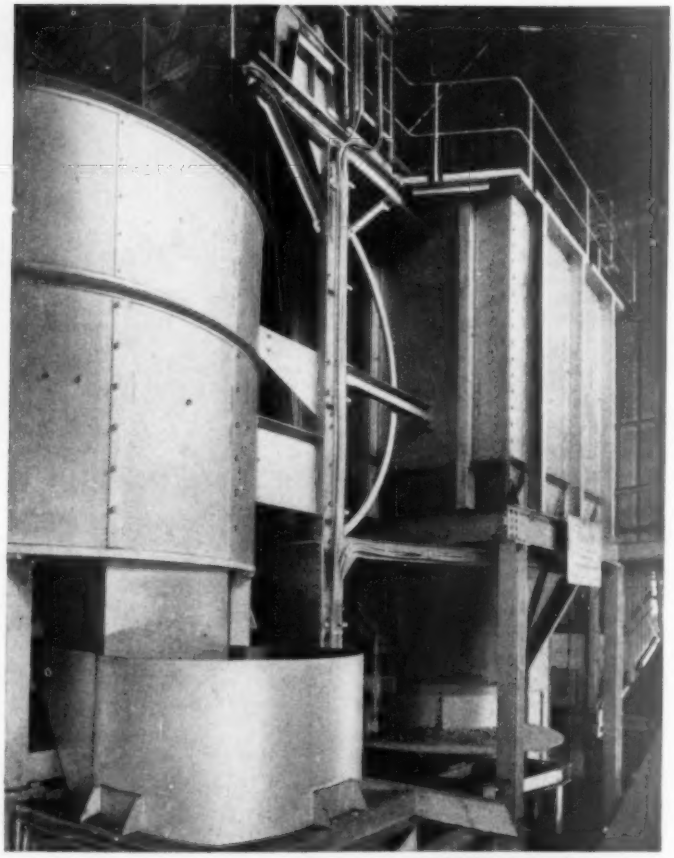

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Vol. 110 March 30, 1961 No. 2312

Quality Amelioration

Americans, more often than Europeans, obtain from industry through private channels quantities of statistics which, if they be reliable, are most interesting. An editorial in *Modern Castings*, commenting on a special conference on "Marketing and its Profitable Application to the Metal-casting Industry," quotes the following as having been said by one of the experts present: "For a fraction of the money lost on casting rejects, foundries can instal adequate quality-control systems that will pay for themselves many times over . . . The trend toward automation requires continuous improvement in the quality of *purchased castings* . . . Modern quality-control techniques can reduce internal defects by 50 per cent., visual defects by 80 per cent., and dimensional defects by 80 per cent."

The words "purchased castings" have been italicized by the present writer because if the defect figures refer to inspected castings—as it appears they do—then it is not quality control that is a prerequisite but a wholesale reorganization of the inspection department. If on the other hand the speaker meant castings before inspection, the figures even then require close scrutiny. If one foundry is running at 10 per cent. total rejects and the second at only 2½ per cent., there is obvious evidence of differing needs for the imposition of stricter control. If the "2½ per cent. foundry" includes all three types of rejects, even at the higher figure of 80, there would be only a saving of two per cent. Yet there would not be much to do and the savings shown might not pay for the additional equipment and personnel. In the case of the "10 per cent. foundry," there would be a reduction of eight per cent., and here, with a sizeable output, there would be a real gain from investment on control measures.

The great feature about such nebulous statements is that they do attract attention to the problem of securing better and more consistent products. Founders in this country are, we sincerely believe, well pleased to institute varying levels of control of their operations commensurate with their incomes—for not all need X-ray inspection. The research associations, the metal development bureaux and suppliers of their raw materials are all most helpful in aiding control. The latest *Broadsheet* issued by the British Cast Iron Research Association on the meaning and use of the carbon-equivalent figures is typical of the practical help available towards quality amelioration. Yet the American approach, though perhaps involving overstatement, does impress the need on a reader's mind.

Forthcoming Events

APRIL 4

Institute of Metals

Oxford local section: "Ductile Fracture," by Prof. R. W. K. Honeycombe, 7.15 p.m., at the Cadena Café, Cornmarket Street, Oxford.

APRIL 5

Institution of Plant Engineers

Southern branch: "Radio-active Isotopes in Industry," 7.30 p.m., at the Grand Hotel, Bournemouth.

Institute of British Foundrymen

North East Lancashire section: Annual general meeting followed by the "History of Mechanized Founding," by R. K. Jackson, 7.30 p.m., at the College of Further Education, Sandy Lane, Accrington.

APRIL 6

Institution of Production Engineers

Liverpool graduate section: "Principles of Materials Handling," by L. F. Hoefkins, 7.30 p.m., at the Stork Hotel, Queens Square, Liverpool.

Institute of Metals

London local section: "Physical Methods of Analysis for Major Alloying Constituents," by K. M. Bills, 6.30 p.m., at 17, Belgrave Square, London, S.W.1, preceded by the annual general meeting at 6 p.m.

Institute of British Foundrymen

Stoke-on-Trent section: Annual general meeting, 7.30 p.m., at the Grand Hotel, Hanley.

APRIL 7

Institute of British Foundrymen

Tees-side branch: Annual general meeting followed by presentation of awards for the apprentice competition and reading of the prize-winning entry in the short paper competition, 7.30 p.m., in the Teesdale Hall, Head Wrightson & Company, Limited, Thornaby-on-Tees.

APRIL 8

Institute of British Foundrymen

Newcastle and district branch: Annual general meeting followed by a foundry film, 6 p.m., at the Rutherford College of Technology, Northumberland Road.
East Midlands branch: Annual general meeting, followed by a film show, 6 p.m., at the College of Arts, Derby.

ISI Annual General Meeting

The annual general meeting of the Iron and Steel Institute is to be held at the Institution of Mechanical Engineers, 1, Birdcage Walk, London, S.W.1, on May 3 and 4. There will be four technical sessions, one devoted to steelmaking and three to the use of computers in the iron and steel industry. The meeting, after the conclusion of the formal business, will hear the presidential address from Sir Charles Goodeve. A members' dinner will be held at Grosvenor House, Park Lane, London, W.1, on May 3 (7 for 7.30 p.m.), at which Sir Howard Florey, president of the Royal Society, will propose the toast of the "Iron and Steel Institute and Industry."

The Institute points out that because in recent years too many applications for tickets have been received, the total number of tickets sold has had to be restricted. Members wishing to attend the technical sessions and/or dinner are asked to complete reply forms and return them to the secretary of the Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1, not later than April 21.

D. NAPIER & SON, LIMITED—Mr. P. J. Daglish, who joined the company, a member of the English Electric Company, Limited, group last year, as a special executive, has been appointed to the board as commercial director.

Dinners

INSTITUTE OF METALS

Although the smaller banqueting hall of Grosvenor House, London, was taken for this year's annual dinner of the Institute of Metals it was filled to capacity, and there were comments that even though the Prime Minister was not expected at this year's function, it might have been better to have had the larger hall than to turn away people who wished to attend. The president of the Institute, Professor H. O'Neill, M.MET., D.SC., Professor of Metallurgy at the University College of Swansea, chaired the function, and the two toasts of the evening, "The Institute of Metals and the Non-ferrous Metal Industries," and "The Guests" were proposed by Mr. W. F. Cartwright, M.I.MECH.E., D.L., J.P., president of the Iron and Steel Institute, and the Rt. Hon. the Earl of Verulam, senior vice-president of the Institute, respectively. The responses were made by Professor H. O. Neill, and Sir Harold Roxbee-Cox, D.SC., PH.D., F.R.AE.S.

Amongst other points made by Mr. Cartwright in humorous vein was the way the pundits were trying to inculcate the idea of steel as being strong, bright and elegant, instead of hot, heavy and dirty, which seems to have been the general idea to date. In his proposal of "The Guests," the Earl of Verulam referred to the large number among the company from kindred institutions, and said that in the next two or three years it was proposed to arrange some consideration between the various institutions of overlapping of functions. Friendly talks would be held with a view to eliminating duplication of activities.

Others amongst the 462 members and guests attending were Mr. G. L. Bailey, a past-president of the Institute; Major C. J. P. Ball, a past-president; Mr. W. E. Bardgett, president, Institution of Metallurgists; Mr. F. C. Braby, chairman, British Non-Ferrous Metals Research Association; Mr. S. E. Clotworthy, chairman, Aluminium Industry Council; the Rt. Hon. Lord Fleck, president, Society of Chemical Industry; Professor Hugh Ford, vice-president of the Institute; Sir Charles Goodeve, director, British Iron and Steel Research Association; Mr. A. A. B. Harvey, president, Institute of Metal Finishing; Mr. K. Headlam Morley, secretary, Iron and Steel Institute; Mr. E. H. Jones, a vice-president of the Institute; Mr. R. G. C. Ludlam, registrar secretary to the Committee of the Privy Council for Scientific and Industrial Research; Professor A. J. Murphy, a past-president of the Institute; Dr. L. B. Pfeil, a past-president; Mr. A. Post, deputy secretary, Iron and Steel Institute; Sir Ronald Prain, a past-president of the Institute of Metals; Mr. W. F. Randall, a vice-president, and Dr. C. J. Smithells, a past-president. Following the dinner there was dancing until 1 a.m.

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The fifteenth annual dinner/dance organized by Crockett Lowe, Limited, the well-known firm of pattern-makers in Birmingham, was held at the Pavilion Suite of Warwickshire County Cricket Grounds. There were over 200 guests present, amongst whom were Mr. John Hollingworth, M.P., and Miss Edith Pitt, O.B.E., M.P., Parliamentary Secretary, Ministry of Health. The chair was taken by Mr. William J. Crockett, managing director of the company. After the dinner there was dancing to the music of Billy Mason and his band, whilst the cabaret show was provided by Roy Billings and Gabrielle Varley, magicians.

Metallurgical Influences on Mechanical Properties of Induction-furnace-melted 13-per-cent. Chromium-steel Castings

By Dr. Jaroslav Koutsky

The 13-per-cent. chromium-steel alloy has been described by foundrymen as a difficult-to-cast material and opinions have been expressed that it is a pity that no substitute has yet been developed. Nevertheless, its use is actually increasing, and more and more founders are endeavouring to cope with its production. In an attempt to clarify casting and heat-treatment procedures this Czech report is reproduced. The Author deals logically with the effect of heat-treatment on the structure and mechanical properties, and the importance of the chemical composition in relation to the (notch) impact strength. The Author's discussion on the effect of metallurgical factors on the structure and mechanical properties of melts from induction furnaces is dealt with partly in this issue and will be completed in a future issue with his analysis and commentary on the results.

The difficulties most frequently encountered during the production of 13-per-cent. chromium-steel castings for water turbines, the chemical composition of which is normally given by the standard as maximum 0.15 per cent. C, 11.5 to 14 per cent. Cr, with or without 0.5 to 1.0 per cent. Ni, are in essence of a twofold nature: on the one hand there is the occurrence of casting skins based on chromium oxides, which float on the surface of the mould or remain trapped throughout the cross-section of the casting and destroy its soundness, and on the other hand it is frequently difficult to attain the required impact strength values. This work is intended to indicate the factors which can influence the values of these properties. The resultant values of the notch-impact strength will clearly be affected by the final heat-treatment to which the castings are subjected. These values can in general be influenced also by the chemical composition of the melt and the method by which it was melted, and thus by metallurgical factors also. To establish which factor is the most potent influence also has considerable importance for production reliability.

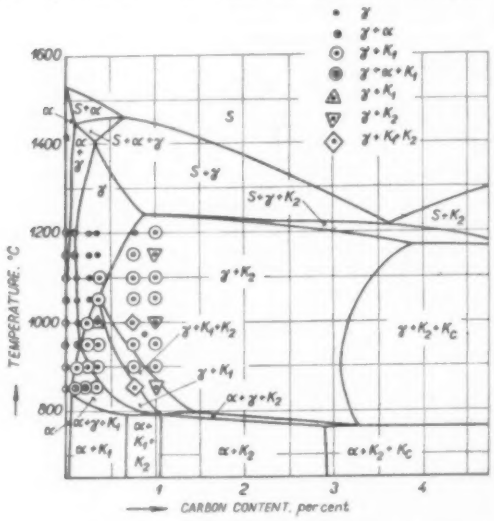

FIG. 1.—*Section of the Fe/Cr/C ternary diagram with 13-per-cent. chromium content*[1]. *Key—S is liquid phase; K_1, K_2, and K_c, relate to the distinct carbide-phases characteristic of this alloy.*

EFFECT OF HEAT-TREATMENT

When considering the most suitable heat-treatment it is necessary to start from the specific properties of this steel. In Fig. 1 is a section of the Fe/Cr/C ternary diagram at a constant 13 per cent. chromium content from the data of Bungardt, Kunze and Horn.[1] As follows from the diagram, chromium as a ferrite former substantially raises the Ac_1 temperature and lowers the Ac_4 temperature. At this chromium content the Ac_1 temperature lies close to about 800 deg. C, while a higher carbon content lowers it somewhat. In view of the fact that in the range below the eutectoid temperature, in addition to ferrite, the special chromium carbide $(Cr, Fe)_{23}C_6$, is present in the structure, and this carbide is more difficult to dissolve during heating than cementite, the purely austenitic range will lie substantially higher than in carbon steels. From the diagram it is further evident that at a very-low carbon content in no instance shall we attain a completely austenitic state during heating; apart from

* Translated from *Hutnické Listy* 1960 **15** (No. 3) 179 to 188. The Author is at the Lenin Works in Pilsen.

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austenite in the structure there will always be ferrite, which on account of the manner of its formation we shall designate as δ-ferrite[2] as distinct from α-ferrite, which forms during gradual cooling from austenitisation temperatures through the transformation of austenite. This δ-ferrite is as soft as α-ferrite and lowers the hardness of 13-per-cent. chromium steel in the hardened state. During the tempering of hardened specimens even up to temperatures around 700 deg. C. no changes are observed within the δ-ferrite, but only on its boundaries do carbide networks appear. Only above this temperature is there frequent formation within the grains of a precipitate which we have already found earlier to be chromium nitride.[3] In the presence of this precipitate, however, we have not noticed marked changes in the hardness of the ferrite,[2] and steels with δ-ferrite in the quenched and tempered state will therefore be somewhat softer than steels without δ-ferrite.

Optimum Structure

Chromium considerably increases the hardenability of steel, and 13-per-cent. chromium steels are therefore self-hardening, and martensite is revealed in their structure even after cooling in the furnace. The results of a series of cooling experiments are shown in Fig. 2. Even at a cooling rate of 300 deg. C. per hour martensite was observed in the structure in addition to ferrite and troostite. The experiments were carried out on mechanically-worked material, so that the absolute values of the impact strength were higher than those attained with cast material. It has shown that the most-advantageous structure from the aspect of impact strength is a mixed structure of martensite, troostite and ferrite. A structure consisting of ferrite and carbides, formed during slow cooling from austenitisation temperatures, had only slightly greater impact strength than a purely-martensitic structure. By comparison with the notch-impact strength values of martensitic structures of carbon steels, in this instance in general the notch-impact strength of the martensite was relatively high.

In view of the low critical cooling rate of austenite it was not surprising that even in 5-cm. thick walls of sand castings from this steel, there was a mixed structure, with a substantial proportion of the martensitic structural component, which naturally increased with the reduction in the cross-section.

Cast Sample

In Fig. 3 is shown the macrostructure of a plate horizontally cast in sand. The plate had an approximate chemical composition: C 0.09, Cr 13.40, Mn 0.49, Si 0.64 and Ni 0.13 per cent. Collectively the structure was made up of three components: ferrite, islands of ferrite and carbides, and islands of martensite (Fig. 4). In the upper part there were more martensitic islands, while in the bottom part there were more islands of ferrite and carbides. Anlysis of the macrostructure shows that the upper half of the plate is formed by solumnar crystallites, but the bottom half by equi-axed crystallites or globular formations (Fig. 3). The impact strength was low, varying from 0.6 to 1.2 kg-m. per sq. cm., but between the upper and lower parts there is no noticeable difference. In view of the presence of martensite, the hardness was high.

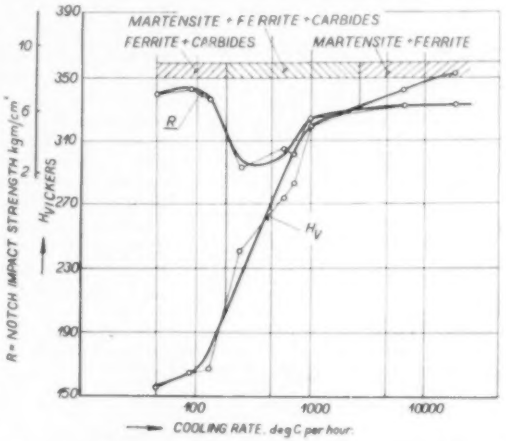


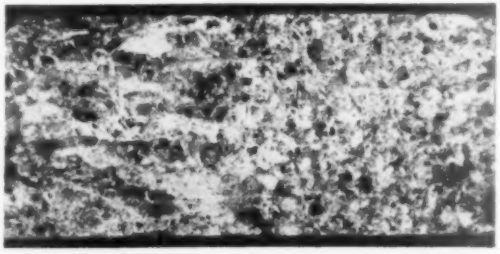
FIG. 2.—*Results of cooling experiments on forged 13.3 per cent. chromium steel with 0.12 per cent. C. The cooling-rate data relate to the range of temperatures 800 to 650 deg. C.*

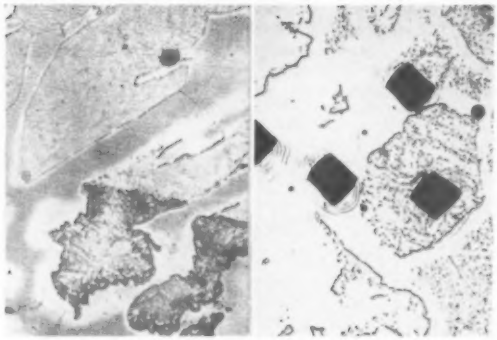
The need arose for heat treatment of the castings, therefore, on the one hand due to the low plastic properties, and on the other hand, for purposes of increasing the machinability by reducing the hardness; primarily this is a matter of cutting-off the casting runners.

Annealing

The normal method of heat-treatment for obtaining maximum machinability is annealing, which consists in heating the material to a temperature closely below Ac_1 point, holding for a certain

FIG. 3.—*Macrostructure of section of sand-cast plate. Etchant—Fry's Reagent.* ×1.2.





FIGS. 4 AND 5.—*Microstructures of sand-cast plate (left hand): etchant—$FeCl_3$. In annealed state (right hand): etchant—picric acid,* ×300.

period at this temperature, and gradual cooling in the furnace. Since the Ac_1 temperature of 13-per-cent. chromium steel is within the limits of 805 to 830 deg. C., an annealing temperature of 800 deg. C. enters into consideration. Specimens from the same plate as in the preceding instance were heated at 800 deg. C. for four hours and cooled in the furnace. The resultant microstructure is shown in Fig. 5. The martensitic islands had transformed into islands of sorbite with (Cr, Fe) $_{23}C_6$ carbides; on the boundaries of the original islands of ferrite and carbides, continuous chains of coarse chromium carbides had formed, and in the δ-ferrite a precipitate had appeared. The steel had certainly softened radically, its hardness being 45 kg. per sq.

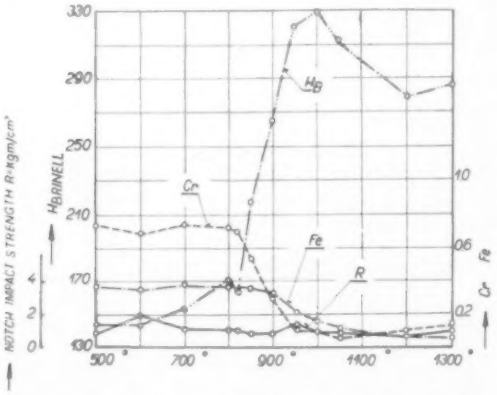


FIG. 6.—*Results of hardening experiments relating physical properties to the hardening temperature.*

mm., there had been an increase in the elongation and reduction-in-area, especially in the part formed by the equi-axed dendrites, but the impact strength had remained very low at 0.8 to 0.7 kg.-m. per sq. cm. Since for these castings the required yield strength was 40 to 50 kg. per sq. mm. and the impact strength 5 to 6 kg.-m. per sq. cm., this method of heat-treatment could not be the final operation to achieve the required mechanical properties. An an operation before cutting-off the casting runners, however, it was completely satisfactory.

The effect of gradual cooling from austenitization temperatures on the impact strength of the cast steel was also investigated. The specimens were treated at 1,000 deg. C. for two hours and cooled at a rate of 20 deg. C. per hour. By choosing a higher cooling rate a mixed structure should have been obtained, similar to the cast state, and the attainment of higher-impact strength values would therefore have been excluded from the outset. The microstructure obtained consisted of ferrite and carbides, and the value obtained for the impact strength was very low: 0.4 to 0.6 kg.-m. per sq. cm.

Hardening and Tempering

As a final operation of heat-treatment to obtain the required mechanical-property values only quenching and tempering comes into consideration. In the given instance the optimum result was fundamentally influenced by the hardening temperature, the tempering temperature and the cooling-rate from the tempering temperature. From Fig. 6 it follows that for the melt investigated the maximum hardness lay between temperatures of 950 to 1,000 deg. C. The specimens were annealed after casting at 800 deg. C. for 4 hr. and cooled in the furnace, the holding time at the hardening temperatures was two hours, and they were then quenched in water. At 900 deg. C. in the ferrite and martensite there were present carbide particles which were not then dissolved, while at 1,000 deg. C. these particles were no longer visible in the optical microscope, and at this temperature the quantity of ferrite in the structure was at a minimum (Fig. 7). At temperatures over 1,000 deg. C. the hardness of the hardened specimens fell, since the quantity of δ-ferrite in the structure rose. Starting from a temperature of 1,050 deg. C. the ferrite was etched more than the martensite, and in the ferrite typical veining appeared. Analysis of the isolated carbide phase, the results of which are also plotted in the diagram in Fig. 6, shows that the carbides were completely dissolved in the temperature range from 1,000 to 1,050 deg. C. The impact strength remained unchanged in relation to the hardening temperature.

Microstructure

The effect of tempering on the microstructure and mechanical properties was investigated on specimens which were quenched in oil from 900, 1,000 and 1,100 deg. C. and tempered at up to 750 deg. C. for 2 hr. and cooled in air. The results are presented in Figs. 8 to 10. The sequence of the static and dynamic properties was basically the same as in the mechanically worked state. After

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quenching from 900 deg. C. the tensile strength and yield point were somewhat lower than for specimens quenched from 1,000 and 1,100 deg. C. The impact strength was consistently lowest at 500 deg. C. and highest at 750 deg. C., while for specimens quenched from 1,100 deg. C. it was substantially lower than for specimens quenched from the lower temperatures. The microstructure of the specimens tempered at 750 deg. C. is shown in Fig. 11. It was formed of coarse sorbite and disintegrated δ-ferrite. By comparison with the microstructure in the cast and annealed states it was considerably more homogeneous.

Embrittlement

The cooling rate from the tempering temperature proved an important factor for the value of the impact strength. If specimens were cooled from the temperature of 750 deg. C. in the furnace

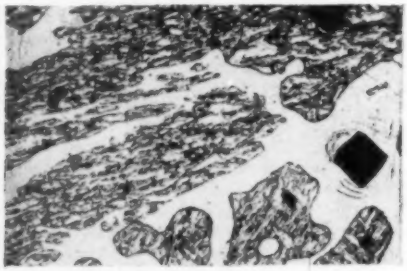
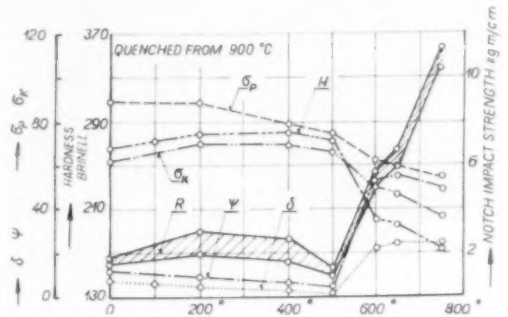
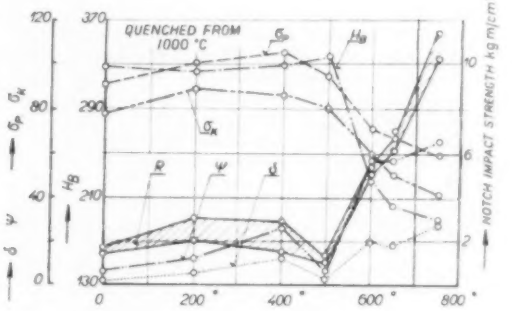
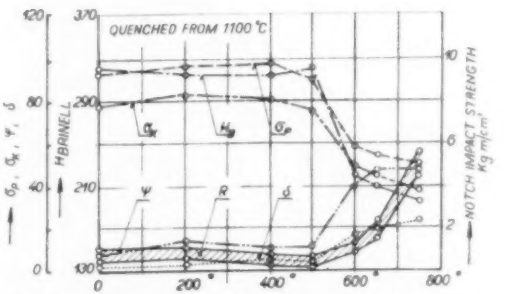


FIG. 7.—*Microstructure of a specimen of a plate after quenching from* 1,000 *deg. C. Etchant—picric acid.* ×300.

at a rate of 20 deg. C. per hr., the impact strength fell from 10 to 11 kg.-m. per sq. cm. for specimens cooled in air to 5.6 to 7.3 kg.-m. per sq. cm., and as a result of even slower cooling at 10 deg. C. per hour to 4 to 5 kg.-m. per sq. cm. Though it was possible in preceding instances to link the low impact strength with a different structure, in this instance it was impossible to establish changes in the structure due to gradual and more-rapid cooling. It is known that high chromium steels are inclined to so-called temper brttleness at 475 deg. C.[4] This brittleness is so-called from the temperature at which it is most marked. Formerly this brittleness has in general been shown to exist in steel with a chromium content of over 15 to 17 per cent., where the predominant structural component was δ-ferrite. The possibility of the occurrence of brittleness at 475 deg. C. in 13-per-cent. chromium steel had been studied by the Author in detail on mechanically worked specimens.[5] It had been established that this steel becomes brittle during long-term heating in the vicinity of these temperatures, but the phenomenology of this process does not coincide with that which was established for brittleness at 475 deg. C. In 13-per-cent. chromium steel, for instance, during embrittlement no increase in hardness takes place. It is possible that this embrittlement is similar to the temper brittleness of structural steels.







FIGS. 8, 9 AND 10.—*Effects of tempering on the mechanical properties of plate specimens after quenching from* 900 *deg. C.* (*Fig.* 8—*top*), 1,000 *deg. C.* (*Fig.* 9—*centre*) *and* 1,100 *deg. C* (*Fig.* 10—*bottom*). *Key: δ—elongation per cent.; ψ—reduction in area per cent.; δв—ultimate tensile strength in kgm. per sq. cm.; δк—yield point in kgm. per cent.*

Optimum Hardening

The facts presented show that the most advantageous hardening temperature for 13-per-cent.

chromium steels will be a temperature of 950 to 1,000 deg. C., if the preceding state is annealed. If the final quenching and tempering were preceded,

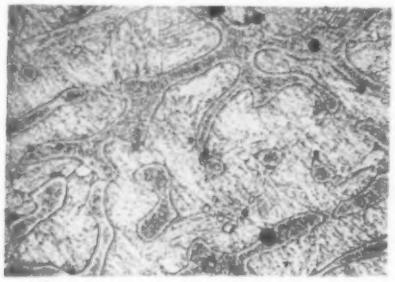


FIG. 11.—*Microstructure of plate specimen after the following heat-treatment: holding for 2-hr. at 1,000 deg. C. and quenching in oil followed by tempering in air after hoding at 750 deg. C. for 2-hr. Etchant—picric acid.* ×300.

for instance, by normalization or homogenisation, so that in the extreme instance only fine carbides were present in the structure, it would be justifiable to lower the hardening temperature to 900 to

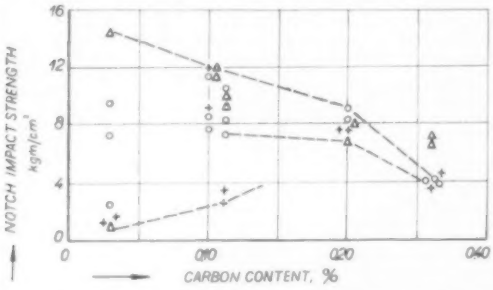


FIG. 12.—*Change in the impact strength of 13-per-cent. chromium steel in relation to the carbon content*[6].

950 deg. C. High homogenization temperatures have a completely favourable influence on the impact strength. High hardening-temperatures applied to a homogeneous, austenitic structure lead, however, to coarsening of the grain, and when applied to a ferritic-austenitic structure, to an increase in the proportion of δ-ferrite in the structure, which in both instances can have an unfavourable influence on the impact strength in the quenched and tempered state. The Author's views on high-hardening-temperatures are supported by American and German practice, which does not recommend the use of a hardening temperature of over 1,000 deg. C. In view of the high hardenability of this steel, cooling from the hardening temperature may even be carried out in air. The most suitable tempering temperature is 750 deg. C., and it is necessary to cool from this temperature as quickly as possible.

Varying Heat-treatment

In view of the fact that, even if these basic conditions are maintained, melts occur which have an unsatisfactory impact strength, experiments were carried out with such variations of heat-treatment as would show an increase in the impact strength by various cycles of heating at the hardening and tempering temperatures. The results agreed completely with the comprehensive study of Zeuner and Heubner.[6] By these methods it is only possible to raise the notch-impact strength very slightly, by a maximum of about 3 kg.-m. per sq. cm. by comparison with the value obtained by simple heat-treatment.

CHEMICAL COMPOSITION AND IMPACT STRENGTH

Stress is laid on the chemical composition primarily in connection with the quantity of δ-ferrite present in the structure. From Fig. 12 it is evident that as the carbon content decreases there is an undoubted rise in the impact strength, provided the content of δ-ferrite does not rise too much. The values of the notch-impact strength established at that time had wide variation, and numerous specimens were brittle.[6] This result is dependent on the

TABLE 1.—*Chemical Composition of the Experimental Melts (per cent.).*

Number.	Castings.	C.	Mn.	Si.	P.	S.	Ni.	Cr.	N.
1	Z1–4	0.12	0.51	0.61	0.024	0.022	0.82	13.0	
2	Z5–8	0.11	0.51	0.54	0.026	0.021	0.84	13.7	0.014
3	Z13–16	0.12	0.73	0.14	0.022	0.016	0.87	13.5	
4	Z17–20	0.09	0.55	0.29	0.012	0.014	0.86	13.4	
5	Z25–28	0.14	0.35	0.47	0.022	0.011	0.28	12.1	
6	F1–4	0.13	0.53	0.57	0.022	0.020	0.84	13.3	
7	D1–4	0.13	0.56	0.45	0.026	0.020	0.85	13.4	
8	D9–12	0.14	0.62	0.66	0.026	0.016	0.82	13.5	
9	D13–16	0.13	0.56	0.54	0.013	0.015	0.95	13.0	
10	T1–4	0.13	0.48	0.41	0.018	0.019	0.84	12.9	
11	T9–12	0.12	0.47	0.57	0.025	0.020	0.84	13.1	
12	T13–16	0.13	0.52	0.68	0.025	0.022	0.83	12.9	
13	T17–20	0.13	0.74	0.40	0.017	0.016	0.85	13.3	
14	L1–4	0.11	0.39	0.49	0.024	0.021	0.89	13.2	0.030
15	S1–4	0.10	0.56	0.49	0.020	0.021	0.89	12.2	
16	S5–8	0.19	0.57	0.58	0.023	0.012	0.82	13.9	
17	S9–12	0.18	0.61	0.53	0.024	0.019	0.83	12.4	
18	S13–16	0.13	0.53	0.59	0.020	0.017	0.82	14.0	
19	S17–20	0.12	0.59	0.61	0.021	0.016	0.88	12.3	
20	S21–24	0.11	0.54	0.54	0.027	0.020	0.94	14.0	

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fact that δ-ferrite is not a particularly-tough phase, and its brittleness is heightened by an increasing chromium content. Provided its quantity does not exceed about 20 per cent., it fringes the boundaries of the primary grains and does not have an unfavourable effect. But as soon as its content in the structure rises excessively, it forms continuous areas, and the probability of the location of a notch in such an area is considerable. Apart from carbon and chromium, the quantity of δ-ferrite is also influenced by the presence of further elements. According to the work of Zing and Geiger,[7] in chromium and chromium/nickel steels the equilibrium between the austenitic and austenitic-ferritic ranges is expressed by the relationship

$$Ni_{\text{equivalent}} = 1.39 \cdot 4.\ Cr_{\text{equivalent}} - 14.342$$

$$Ni_{\text{equivalent}} = \text{Ni per cent.} + \text{Co per cent.} + 0.5 \text{ per cent. Mn} + 30 \text{ per cent. C} + 7.5 \text{ per cent. N}$$

$$Cr_{\text{equivalent}} = \text{Cr per cent.} + 2 \text{ per cent. Si} + 1.5 \text{ per cent. Mo} + 0.5 \text{ per cent. Nb}$$

In order that the structure will be completely austenitic at the hardening temperature, at all events the left-hand side in the first equation must equal the other. Strong austenite-forming elements, apart from carbon, are nitrogen and nickel, and silicon and chromium are ferrite formers. In the third equation the additional powerful ferrite-former, aluminium, is not taken into account.

PROPERTIES OF INDUCTION-FURNACE MELTS

For the choice of the factors which it was decided to investigate in this study, starting mainly from the experience of the Authors' steelworks and scant

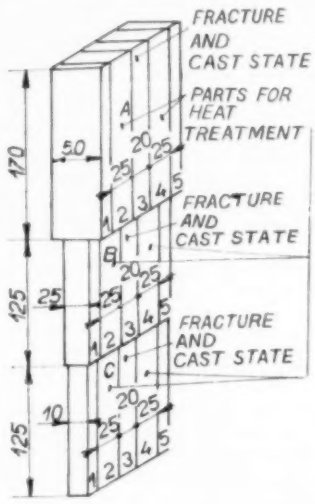


FIG. 13.—*Shape of experimental castings and method of taking the specimens.*

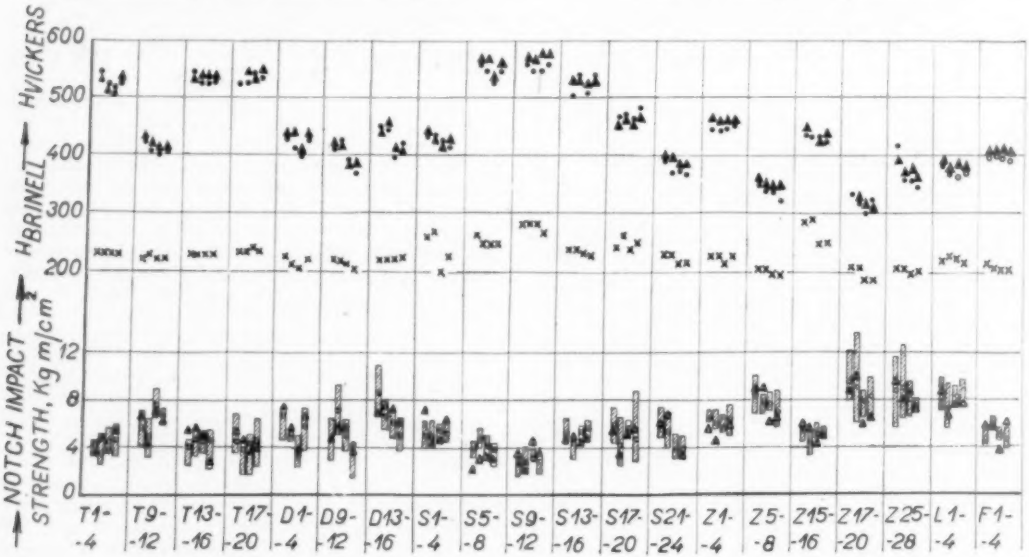
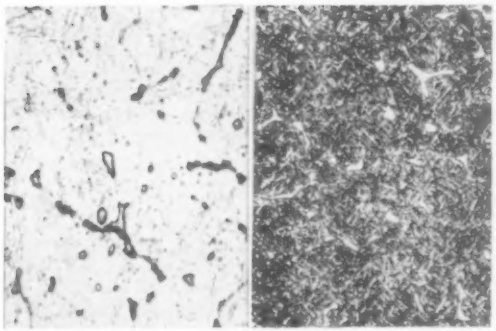


FIG. 14.—*Results of tests of the individual melts: average hardness H_V of parts B and parts C in the cast state; average hardness H_B of parts B in the quenched and tempered state; average impact-strength value R of parts B and C in the quenched and tempered state; variation in the values of the impact strength R of parts B in the quenched and tempered state.*



FIGS. 15 AND 16.—*Microstructures of samples Z1 in cast state (left hand) and Z3 in quenched and tempered state (right hand). Etchant—picric acid.* × 100.

literature data. Attention was devoted to the following main factors: (1) The melting furnace: a basic, or an acid lining; (2) the metallurgical process: the effect of the charge, of the type of ferro-chromium, of the method of adding the ferro-chromium, and of the method of deoxidation; (3) the effect of the melting and casting temperature; (4) the method of casting: in a normal atmosphere or a protective atmosphere; (5) the effect of various wall thicknesses.

Although the effect of the chemical composition had already received attention from the Author and other workers,[6] attention was also paid to it in this work, in order to compare its action with that of the other factors which had not been investigated previously.

Melting

Melting was carried out in a 40-kg. high-frequency furnace. As the basic casting we chose wedges with wall thicknesses of 10, 25 and 50 mm. (Fig. 13), weighing about 10 kg. The wedges were top-poured into drysand moulds. 20-kg. from each melt were normally deoxidised with 0.05 per cent. Al and the remaining 20-kg. with 0.15 per cent. Al. One casting was poured at a high temperature of 1,560 to 1,600 deg. C., and one at a low temperature of 1,460 to 1,500 deg. C. The basic melt was worked in such a way that low-carbon steel and ferro-chromium were charged at the same time and melted under a glassy slag. The melt was heated to 1,620 to 1,650 deg. C., the slag drawn-off, and deoxidation was carried out with ferro-manganese and ferro-silicon. Deoxidation in the ladle was carried out with aluminium. For each melt, only one of the basic factors was intentionally changed, and its influence was investigated in relation to the different wall thickness of the casting, to a different casting temperature and a different aluminium content. With regard to the chemical composition, in so far as its effect was not studied directly, an endeavour was made to maintain within the limits of the internal work's stan-

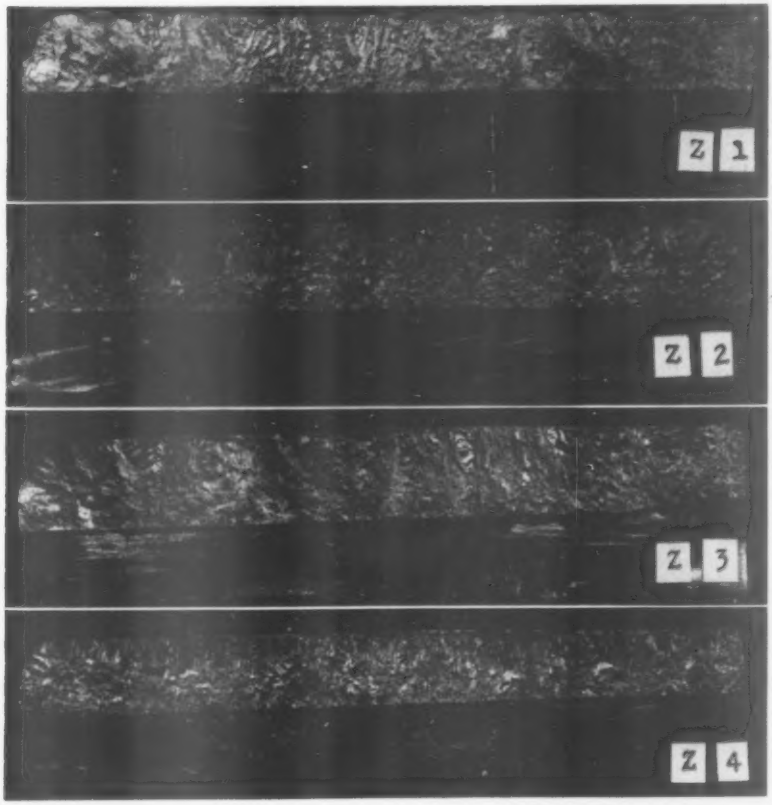


FIG. 17.—*Fractures of parts B from melt Z1 to Z4 (acid-lined-furnace melt): Z1, Z3 high casting-temperature; Z2, Z4 low casting-temperature.*

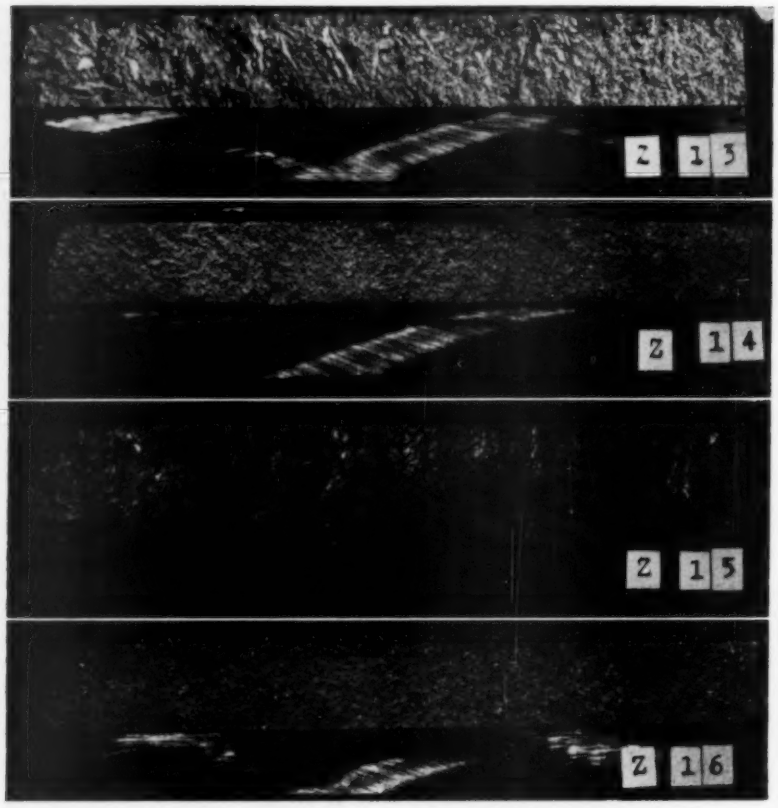


FIG. 18.—*Fractures of parts B from melt Z13 to Z16 (basic-lined-furnace melt): Z13, Z15 high casting-temperature; Z14, Z16 low casting-temperature.*

dard: C 0.10 to 0.14, Mn 0.40 to 0.60, Si 0.30 to 0.70, Ni 0.60 to 1.0 and Cr 12.5 to 13.5 per cent. After casting, the wedges were sandblasted, notched, and fractured along their length. In the cast state the appearance of the fracture, the microstructure and the hardness sequence were studied. The wedges were uniformly heat-treated by homogenization at 1,050 deg. C. for four hours with cooling in air, and by hardening at 950 deg. C. and quenching in oil, followed by tempering at 750 deg. C. for two hours with cooling in air; from them, impact-strength test pieces were prepared. A further study was made of the microstructure and hardness in the quenched and tempered state.

Effect of Furnace, Ferro-chromium and Remelting

Acid-lined Furnace

The results of the notch-impact strength and hardness values for the standard melt in an acid-lined furnace, designated Z1 to Z4, are given in Fig. 14. The microstructure in the cast state was made up of martensite and islands of δ-ferrite, which were for the most part fringed by narrow bands of troosite (Fig. 15). In the quenched and tempered state, in the sorbitic background of the specimens with the higher aluminium content there are present light-coloured islands of δ-ferrite (Fig. 16), while the microstructure of the specimens with the lower aluminium content is sorbitic. From the photograph of the fractures of parts B (Fig. 17) it was evident after casting at the lower temperature the macrostructure had a finer grain, and the zone of columnar crystallites was diminished in area. The effect of the lower and higher aluminium contents was not in this instance visibly evident on the macrostructures of the fracture surfaces.

Basic-lined Furnace

Castings Z13 to Z16 were from the melt which was worked in the same way as in the preceding

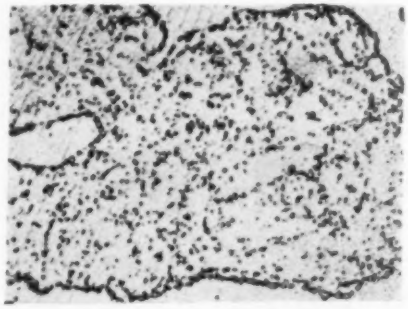


FIG. 19.—*Microstructure of casting Z17 in the quenched and tempered state. Etchant—picric acid.* × 800.

instance, but in a furnace with a basic lining. The hardness limit in the cast state showed no marked difference between the two melts. Both melts had

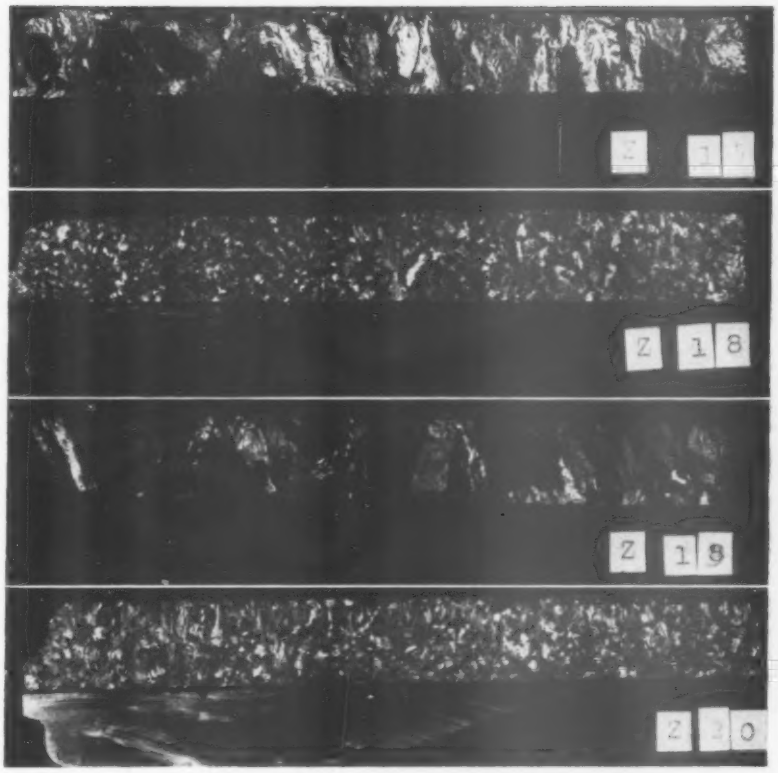


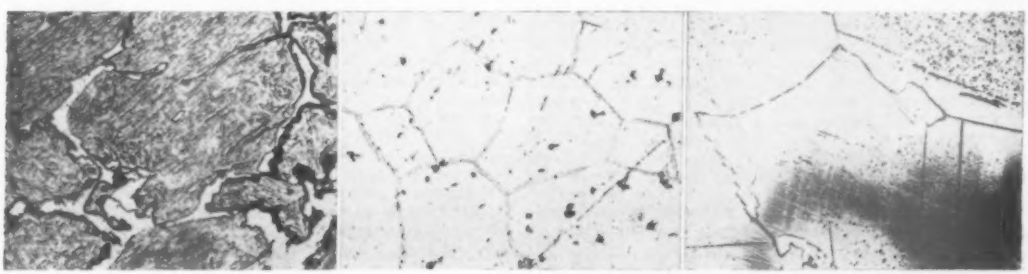
FIG. 20.—*Fractures of parts B from melt Z17 to Z20 (basic-lined-furnace melt): Z17, Z19 high casting-temperature; Z18, Z20 low casting-temperature.*

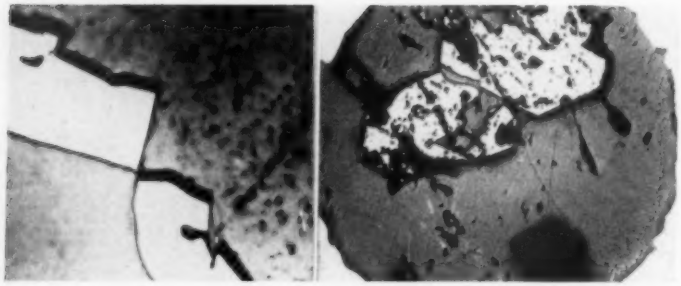
very close chemical compositions (Table 1). Likewise the impact-strength values of parts C had approximately the same level; only the impact-strength values of parts B were somewhat lower for the basic-lined furnace melt. In the impact-strength values of these melts the effect of the casting temperature and the aluminium content were not pronounced. Concerning the microstructure of the cast, and quenched and tempered, specimens, here the same description applied as in the preceding instance. The macro-structure of the fractures, especially of the castings poured at the lower temperature, had a substantially finer grain than for the melt from the acid-lined furnace (Fig. 18).

Preheating of Ferro-chromium

For melts Z5 to Z8 and Z17 to Z20 the metallurgical method was changed in the sense that preheated ferro-chromium was charged into the furnace after the carbon-steel charge had been melted down. Both melts, in view of the low carbon content and higher chromium content in the first instance, and of the very low carbon content in the second instance, had substantially lower hardness in the cast state than the preceding melts. In their microstructure there was understandably much more δ-ferrite than in the preceding melts. In the quenched and tempered state the ferritic grains were devoid of any precipitate at all, except at the grain boundaries, where coarse carbides had precipitated (Fig. 19). The higher aluminium content

FIGS. 21, 22, AND 23.—*Microstructures of sample Z25 in cast state, etchant—picric acid (left hand); of fine grain (centre) and coarse grain (right hand) ferro-chrome, etchant—HNO_3 + alkH_2O, HC*1. × 100.





FIGS. 24 AND 25.—*Microstructures of coarse-grained ferro-chromium (left hand), × 800; inclusion in coarse-grained ferro-chromium (right hand), × 100.*

was expressed not only in the greater quantity of δ-ferrite present, but also in the lower hardness, and especially markedly in the lower impact strength values of parts B and C. The drop in these impact-strength values appeared to be the same for the melts from furnaces with acid, and basic linings. For the basic-furnace melt on parts B there was a greater variation in the impact-strength values, evidently as a result of the greater quantity of δ-ferrite. The fractures in the cast state may be defined in both instances as typical, crystalline fractures (Fig. 20). For the basic melt (Z17 to Z20) the fractures had without exception coarser grain. For the acid-lined furnace melt the higher aluminium content showed an especially marked extension of the columnar zone.

Remelting

Melt Z25 to Z28 was worked in such a way that chromium steel was melted in an arc furnace and remelted in an acid-lined high-frequency furnace with the addition of a small quantity of nickel, silicon and manganese. Therefore the carbon content was higher, and the chromium content lower, than for melts Z1 to Z4 and Z13 to Z16, the hardness in the cast state was lower than for the latter melts, and in the microstructure a relatively-large quantity of δ-ferrite is apparent, around which the troostitic-phase forms relatively wide bands (Fig. 21). In the quenched and tempered specimens with the lower aluminium-content the structure is sorbitic and heterogeneous, while in those with the higher aluminium content ferritic islands are also present. In the given instance the higher aluminium content very much extends the zone of the columnar crystallites.

For melt F1 to F4 we used coarse-grain ferro-chromium, whereas in all the preceding melts fine-grain ferro-chromium was charged. The difference in the grain size is apparent from Figs. 22 and 23. The smaller grains of the fine grain ferro-chromium are surrounded by coarse carbide sheaths. In the coarse-grain ferro-chromium, in some areas, very coarse-carbide particles were precipitated on the grain boundaries, which for the most part have a regular, crystallographic shape (Fig. 24). Within the ferritic grains, especially in the twinning planes, a very-fine precipitate has been liberated. The average purity of the fine-grain ferro-chromium is worse than that of the coarse-grain material. In the coarse-grain ferro-chromium coarse, complex-oxide inclusions occur less frequently (Fig. 25). In the cast state somewhat more δ-ferrite is present in the structure than in a standard melt, so that the average hardness is also somewhat lower. In the quenched and tempered state, in the specimens deoxidized with a lower quantity of aluminium a fine precipitate is liberated within the ferritic grains, while at the higher aluminium content the ferrite is without a precipitate. The fractures of the cast specimens differ from the standard melts by the coarser character of the grain.

(To be continued)

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Royal Society's Endowed Prizes

The Royal Society of Arts, as trustee for the undermentioned endowments, offers the following prizes during the year 1961:—The Howard Prize of £50 for mechanical motive power and the Fothergill Prize of £20 for fire prevention or fire-fighting. The Howard Trust was established in 1868 for the purpose of making awards periodically to the authors of treatises on steam or other motive agents, and a prize of £50 will be awarded to the author of a treatise on some aspect of the subject of motive agents. Under the Fothergill Trust (established by the will of Dr. Fothergill in 1821) a prize of £20 is offered for a descriptive essay or model embodying some new idea for the prevention or suppression of fire.

SCOW at Leipzig Spring Fair

Personal contact as a preliminary to doing business in Eastern Europe was urged by Mr. Peter d'Subin, of the Newport Division, Steel Company of Wales, Limited, at the Leipzig Spring Fair. SCOW was exhibiting for the first time at the fair, although business with East Germany has been going on for several years.

Mr. d'Subin said: "To do anything in the East European market, you have got to be there and go on being there." East Germany and other East European countries were comparatively flexible within their scheme of overall planning, he said. There were sometimes marginal changes in their requirements, and it was necessary to be there to see to their needs.

Foundry Terms

By Jacques

Foundry terms and colloquialisms go back into antiquity, but many of them are being replaced and new ones coined in this age of modern scientific founding. The Author mentions a few words and phrases by which the older school of moulders well understood each other, and refers with some nostalgia to their uses and applications. He believes that the "new order" will detract from the "richness" of foundry parlance, and that some of the more-recent terminology is less descriptive and less succinct that that of the previous generation.

A recent discussion on both oldtime and current mould-shop terms used for describing various foundry methods and their applications became rather confusing to many of the writer's audience of the younger foundrymen. Although any attempt to compile a standard comprehensive work on foundry nomenclature would appear to be a tremendous, if not an almost impossible undertaking, it is quite entertaining to examine a few of the terms and their meanings. Foundry terms vary with the district, but most of them have been handed down over many generations.

It was noticeable in the discussion referred to, when trying to find alternatives to some of the quite brief phrases and individual foundry words, that traditional ones do convey to those that know them precisely the meaning intended and with a clarity that no others seem to have. It follows, however, that many of the words when used outside the moulding shop represent something quite different, and it would be a most unusually comprehensive dictionary that carried mention of them as being used for the practical side of foundrywork. For the most part, such words or idiomatic expressions represent a nightmare to translators and, for this reason, should be used sparingly in international communications.

Wick (*wick*), *adj:* lively, fast moving.

Anything which is *wick*, in parts of England (particularly in the North), could mean something alive and fast moving which can dodge about with incredible speed. *Wick* is also used in other ways, but in the moulding shop when applied to molten metal, the term indicates that *wick* metal will flow into all corners of a mould and over thin sections without coldshuts, misruns, etc. What other single word could convey the same description? "Not hot enough" would maybe cover "dull" and "sluggish" metal, but on the other hand, there is "hot" metal which can be anything but *wick* enough! *Wick* metal is usually clean and free flowing; it can also be "throttled" by a small *git* at the bottom of a too-large "downright" or "downgate."

Git (*git*), *n:* gate, ingate.

The word *git* is common in the Midlands, presumably as a Black Country distortion of the word "gate," meaning the runner inlet cut into a mould. For example, a small *git* and an oversize "downright" will "hosepipe" the flow of metal considerably, hence the standing rule "never cut a git directly in front of a *cod*, or the flow of metal will impinge on it and probably "scab" the face off!

Cod (*cod*), *n:* extension of a foundry mould top-part extending below joint-line.

A *cod* in moulders' parlance is a below-the-joint-line section of a mould which may require "tied-gaggering" (criss-crossed "lifters"), for such masses of sand which are to be lifted out of the *drag* as part of the *cope*, meaning, respectively, the bottom-part and top-part of a mould. Sometimes, for small *cods*, a *wood soldier*—a short piece of wood dipped in clay wash and rammed in place—will help to ensure a clean "lift" and permit the *cope* to be rolled over without parts of the *cod* falling away; just the job for *greensand* moulding!

Greensand (*green sand*), *n, adj:* natural sand undried/s (as in green stick).

What is *greensand*? Many facile pens handled by experienced lexicologist/foundrymen have given various descriptions to explain the term, but such sand is not green in colour—though some say that years ago moulding sand imported from Belgium was actually of a green tint. Nowadays, the word in foundry parlance means any sand (or other material) in its natural or undried state, like green wood. It may be asked, with the modern developments of many kinds of synthetic sands, whether *greensand* is still a correct description, but no doubt it identifies a type of material and the process where such material is applied and its use is understood by founders all over the world.

Tidger (*tij/er*), *n:* striker bar

To tell a loose-pattern moulder to go easy with his *tidger* is an instruction not to "belt" the rapping-bar with it in a too-heavy-handed manner, for though an extra rap or two on a pattern awaiting withdrawal from a mould will often provide a clean lift, it is a procedure which is very destructive to light wooden patterns.

Drawing air (*drawing ar*), *process:* sucking of air or gas into a mould.

Drawing air is an expression often used in a

Foundry Terms

foundry's "medium" and "heavy" moulding sections, but the phenomena is not always clearly understood by theorists or practical men. In the writer's understanding, the expression describes what happens when "risers" or "feeders" are left open during pouring; the heat generates high gas- and air-pressures inside the mould and such expanded gas rushes out through any open exits to atmosphere. Under such circumstances, the vortex or venturi effect so created will suck in air from outside the mould, through the sand itself or through vents. Because of this, an open feeder-head or riser can often be the cause of mould-face peeling and scabbing defects in castings. Temporary closure of risers and heads is always advisable as a precautionary measure; smaller ones can be covered with paper weighted with sand, but large feeder-heads should be fitted with lids, "loamed" around the joint. Such safeguards retain a degree of positive pressure inside a mould and during pouring cause air and gas to be forced out through vents or the sand itself (this rise in internal pressure can be readily observed at various points during the pouring).

The list of terms peculiar to the foundry industry is a long one, the examples quoted being merely indicative of the wealth of the language. Undoubtedly, with the advent of applied foundry science and need for technical description, there is a necessity for an international terminology which is both erudite and correct in diagnosis. Yet for brevity and precise meaning, the writer retains his love for the oldtime traditional words and phrases. He believes that many of them are well worth understanding and retention where circumstances fit and other descriptions do not seem so apt.

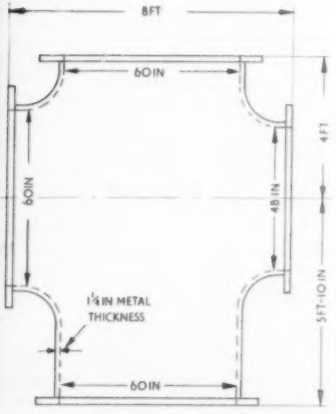
AN INCREASE OF £2,500,000 in the Government's grant to the Department of Scientific and Industrial Research for the coming year is shown in the Civil Estimates published on Tuesday. The largest increases come in the grants for investigation and research in the scientific field as well as in post-graduate training awards. Grants for scientific research both in universities and to other bodies and individuals will be increased by over £1,000,000 to £2,600,000.

AVERAGE PRICES of basic materials purchased by manufacturing industry in the UK rose slightly in February, according to figures given in the Board of Trade *Journal*. In the engineering and electrical industries, prices of tin, lead, zinc, and copper recovered from the decline over the past three months. It is stated that an increase in the price of iron castings also contributed to the higher materials costs in the engineering and electrical sectors.

Four-way Pipe Junction

A four-way pipe weighing 6½ tons was cast recently by James Brown, Limited (Natal, South Africa), for Umgeni power-station. The casting shown in the accompanying illustrations was moulded by the dry-sand process in the vertical position as shown. Pattern equipment consisted of a strickle-board for the main body with skeleton pieces for the side branches. The metal thickness was 1¼ in.; the width across the side branches 8 ft. and height 9 ft. 10 in. This company are sub-contractors for the supply of all the large-bore cast-iron piping for the project involving a total weight of 55 tons of castings, the pipes ranging in internal diameter from three to five feet.

Finished 6½-ton four-way pipe-junction casting as set up for machining, and a sketch showing its principal dimensions.



Notes from the Branches

Lancashire

At the March meeting of the Lancashire branch of the Institute of British Foundrymen there was a good attendance of members to hear Mr. E. H. Beech deliver his paper entitled "Are New Corebinders Worthwhile in the Jobbing Foundry?" The author commenced by stressing that only by ready acceptance of new ideas, and the introduction of new techniques and materials could the foundryman expect to be able to improve his products and be in a position to meet competition. He then proceeded to illustrate and give details of the cold setting binders now being used in his foundry. At the end of the paper, a vote of thanks to Mr. Beech was proposed by Mr. R. L. Handley, which Mr. Connah seconded.

Discussion

Early on in the discussion which followed, doubts were expressed by one member as to whether Mr. Beech's foundry was in fact a jobbing foundry since it appeared that in his patternshop coreboxes were made to the foundry's own requirements—jobbing foundries, he said, usually had to take what came, some coreboxes received could be 20 years old! Having made this point the member went on to inquire about the effect of using cold setting material for greensand moulds; whether castings thus produced were free from blowholes, and could such sands be used with a jolt/ram machine or 'slinger. Mr. Beech said providing there was no "undercut," there would be no ill effects from using the cold-setting type of core sand for greensand moulds, in fact, machinability of castings was improved when the new material was used; a 'slinger could be used and jolt-ramming was possible but somewhat expensive.

In answer to further questions, the author said that advantages of cold-setting mixes over CO_2 Process adoption were that breakdown was better; the CO_2 Process was expensive and assessment of gassing times was difficult. With the new binder, setting was automatic, but bench-life could be modified, *e.g.*, the warmer the sand the shorter the bench-life. He said he used standard tackle for lifting—the maximum for sand pockets was about 5½-in. deep, with just the odd gagger. Previously Mr. Beech has said that in making a 2½-ton casting he had dispensed entirely with gaggers in the top part and sprigs in the bottom. Reclamation of sand when using "cold set" was too expensive in his opinion, and he acknowledged that there was some difficulty in core-iron removal, but added that about one-third dressing time was saved with some castings. He also agreed with a member who said that he could not employ "drop runners" when using the special sand mix because of "eating in." Moulds produced were hard and as such castings made in them did not require so much feeding as with other processes. As to behaviour on heavy sections, he had had good results on a gear-wheel of 20-ft. dia. with 8-in. sections; here setting had taken about three hours.

Mr. Beech went on to say that quantity prepared at a time must suit the corebox capacity and application of the new binder to small coreboxes was limited. Asked about the expense of changing over to cold-setting material, Mr. Beech replied that he thought the cost of the changeover had been justified by results; in fact, in the case of one casting referred to, it actually cost the customer less due to the re-costing of the new methods and also machinability was improved. To a further query about the amount of supervisory discretion needed at "floor level," Mr. Beech pointed out that reliable men were needed no matter what methods were used; by the new sand-bonding process his foundry was producing a better product in less time. The discussion closed with a member saying that a foundry in the area had started using cold-set eight years ago and were still using it, thereby effecting great savings on castings of 3-in. and 4-in. section. This speaker endorsed Mr. Beech's claims for the process.

Programme Extended

In response to many requests, the Lancashire branch of the Institute have had flown over from Switzerland the film entitled "The Automatic Buehrer Moulding and Pouring Plant in the Malleable Iron Foundry of Geo. Fischer, Limited." This film will be shown as an extra item on the programme at the branch annual general meeting on Saturday, April 15, commencing at 3 p.m. in the Midland Hotel, Manchester. A second opportunity to see the film will thus be afforded for those who were unable to be present at the previous showing in Manchester, and guests will also be welcome—by arrangement with the local secretary (Mr. H. Buckley, 44 Woodbridge Avenue, Audenshaw, Manchester).

Beds & Herts Section

Nearly 100 members and guests joined the president of the Beds. & Herts. section, Mr. F. C. Baker, the national senior vice-president, Mr. D. A. Richards, and London branch president, Mr. D. A. C. Hutchison, at the section's "Men Only" dinner held at the Wilbury Hotel, Letchworth, Herts., on March 10. The visitors included Mr. H. W. Keeble of K. & L. Steelfounders & Engineers, Limited; Mr. P. Bucher of Britannia Iron & Steel Company, Limited; Mr. W. T. Hobkirk of J. Hobkirk, Sons & Company, Limited, and Mr. T. Wills, IBF London branch assistant secretary.

At speech time, Mr. Baker thanked the senior officers for their interest in the section, and said how pleased he was that they were able to be present. He also expressed appreciation of the assistance given to the section by various firms in the district, particularly K. & L. Steelfounders & Engineers, Limited, and W. H. Allen, Sons, & Company, Limited, for the use of their lecture rooms and projectors; finally, he acknowledged the work of the section's Council and secretary. Mr. Baker mentioned that he was very concerned about the section not keeping up its new-membership rate and asked those present to help in this respect.

Mr. H. W. Keeble began by saying that it was with a sense of pride that he proposed the toast to "The Guests and Visitors," and went on to say how delightful it was that both Mr. Richards and Mr. Hutchison had been able to find time to join the "youngest" section that evening. He welcomed Mr. P. Bucher, who had returned from Switzerland to join the party, and Mr. Hobkirk, the "elder statesman" of the section, who always did so much in the background.

Mr. D. A. Richards responded with a witty speech in thanking the section for its hospitality on behalf of the guests. In proposing the toast to the section, Mr. Hobkirk said he was more than pleased to be present as last year he had missed the dinner due to illness. He also urged the need to recruit new members whenever possible. Mr. Hutchison responded for the members in very humorous vein. The evening concluded with entertainment by "Jo and Julia" and comedian, Len Tibbs, and his pianist.

As usual the evening was a very lively and enjoyable affair, with Mr. "Len" Harbourne as master of ceremonies contributing much to the gaiety of the proceedings.

"Perks" and the Tax Man

By "Barrister-at-Law"

At the present day, the tendency appears to be for the old-time foundry craftsman, who prided himself in his work, to diminish in number, and employers of labour in foundries as in other spheres, are finding it difficult to discover adequate substitutes for pride in a job. Thus there have grown up a number of perquisites (or "perks" to use a colloquialism) that go with certain jobs—for example, luncheon vouchers, subsidized canteen meals, clothing at cost price, free kits of tools, and so on.

Partly owing to this changed order of things also, employers are to a greater extent than ever before, holding out inducements in order to obtain the right type of man for key jobs. Such inducements may take a variety of forms—a free house; a free car (with petrol, oil and maintenance thrown in); facilities to buy goods on hire-purchase without any interest on the advance; options to acquire shares in the employer company on very favourable terms, are but a few examples of the benefits offered.

Benefits of this sort bestowed on employees, raise interesting tax questions, and there have been quite a few cases on this topic. These "perks" are clearly part of the emoluments of the employee, and their value may be taken into account in assessing him to tax, the assessment being under Schedule E. The test as to whether a benefit of this kind is taxable depends on whether by its nature it is capable of being turned into money, whether in fact, it has a potential value. It does not matter whether the benefit is in the nature of property, such as a suit of clothes, or whether it confers some contractual right on the employee which saves him expenditure which otherwise he would have to incur, such as the right to live in a house, or to have the outgoings, such as rates, and taxes, repairs and the like, paid for by the employer.

Assessment

In all these cases, an important point is to determine the proper method of the assessment of the value of the benefit received. One principle to be noted in particular is that when a gift of some article is made to the employee, it is not the original cost of the article to the employer, but the value in the hands of the employee, which has to be ascertained. Thus, if the employer paid £100 for a new article which he immediately presented to the employee, but the employee could only get £75 for it if he were to sell it there and then, the value of the benefit received by him would be £75 and not £100.

Recently, the House of Lords were called upon to determine the value of an option conferred on an employee to take up shares in the company which employed him. In this case, *Abbott v. Philbin*, the company offered the employee, in October, 1954, an option to acquire ordinary shares in the company at 68s. 6d. per share. The price to be paid by the employee for the option was £20. The option, however, was not exercised by the employee until about 18 months later in March, 1956, by which time the shares had risen to 82s. The increase in the value of the shares in the interval amounted to £166, after deducting the cost of the option. The price at the date of the grant of the option in October, 1954, being £856 odd, and at the date of its exercise in March, 1956, being £1,025. The House of Lords held by a majority that the material date for the purpose of assessing the value of the option, was the date of its grant in 1954, and not the date of its exercise in 1956, so that the employee was to be assessed on the basis that the value of the benefit received was the option price of £856 5s. less the proportionate cost of its acquisition (£2 10s.), *viz.*, £853 15s. The increase of £166 in the interval was to be treated as merely a capital accretion which would not attract tax.

A benefit must of course be capable of being turned into cash if it is to be taxable. Some benefits may lack this essential character of taxability. Suppose for instance, that the employer agreed to bear the interest on a hire-purchase transaction entered into by the employee. Instead of the employee dipping his hand into his pocket to pay the part of the instalment which represented interest, the employer would bear the burden himself. In such a case the interest thus paid out by the employer on the employee's behalf would be assessable to tax as part of the employee's emoluments. On the other hand if the employer himself bought the article and then sold it on hire-purchase to his employee, without charging him any interest on the advance, the interest thus saved, and which ordinarily would have had to be paid out to a finance company if they instead had financed the transaction, would not be an emolument, and would not attract any tax as far as the employee was concerned.

Corrosion Prevention Exhibition

An exhibition on metallic corrosion and its prevention was opened to the public at the Science Museum, South Kensington, London, S.W.7, on Monday, March 27 (closing at 6 p.m. on Saturday, April 22). The collection of exhibits relating to corrosion and preventive measures has been assembled by the corrosion group of the Society of Chemical Industry to mark the First International Congress on Metallic Corrosion, to be held in London from April 10 to 14, under the presidency of Sir Harry Melville, K.C.B., D.SC., F.R.I.C., F.R.S.

It has been estimated that the yearly cost of corrosion to Great Britain alone is at least £200,000,000. The subject is, therefore, of national importance and of direct interest to the layman, and the exhibition, though of particular interest to the delegates to the Congress, has been designed to be intelligible and interesting to non-specialists. It sets out to answer in simple terms the questions: What is corrosion?; how and when does it take place?, and what can be done to prevent it?

AI School for Appliance Salesmen

A Sales School is being established by Allied Ironfounders, Limited, at their research and development department at Smethwick for builders' merchants' salesmen and for members of the company's own sales force. New premises adjoining the laboratories of the research and development department are now being equipped, and the first course will be held in April. Each course is expected to last a week. Full instruction will be given on the working of the domestic-heating appliances made by the company, the functions they are designed to fulfil, etc., so that salesmen will be able to give customers sound advice based on experience of the product.

Invitations to merchants to send representatives to attend these courses will be issued shortly by Mr. Charles Insch, sales director of the domestic-appliance division, Allied Ironfounders, Limited, Orchard House, Orchard Street, London, W.1.

Equipment and Supplies

Spectrometer

Housed in the laboratory building at the Pretoria works of the South African Iron and Steel Industrial Corporation, in a sound-proofed room where temperature and humidity are carefully controlled, are two Quantovac spectrometer units recently installed at a cost of approximately £50,000. After a period for testing and the training of personnel, the apparatus will be used to analyse samples from the steel-melting plant and blast-furnaces in a fraction of the time now taken to perform this task by chemical analysis.

The Quantovac was developed to analyse those wavelengths of the non-metallic elements in the far ultra-violet spectrum, this being achieved by removing air from the optical path, as wavelengths in this region are absorbed by it. Since the arc or spark source cannot operate in a vacuum, the evacuated chamber is flushed with argon gas which does not absorb as strongly as air. Each of the spectrometers consists of three separate units—a source unit which supplies voltage—an excitation unit which draws its power from the source unit—and a recording console which evaluates and records information supplied by the excitation unit. Outside the laboratory building is a unit which houses generating plant ensuring an electronically-controlled power-supply to the source units, and air-conditioning plant.

Samples are received by pneumatic tube within 40 sec. of being despatched from the steel plant 400 yd. distant, and from each one a disc is cut, with diameter about that of a five-shilling piece and ¼-in. deep. The cut surface is then polished on another machine. This preparation is important, as a slight flaw in the surface can upset the analysis result. The disc is then placed over an opening in the spark chamber of the spectral lines of the various elements, reflecting them on to photo-multiplier tubes.

The output of each tube is recorded automatically so that the relative radiant powers of the elements of the sample can be read. This permits simultaneous determination of all the elements in a steel analysis, both metals and non-metals.

From the time that the "start analysis" button is pressed, there is but a few seconds' delay before the analysis figures are read from a moving graph in a window of the recording console. Using the Quantovac, it is possible to have a full analysis back at the steel plant seven minutes after the sample has been taken from a furnace there. Besides time and labour saved in the process of analysis, the availability of a quick analysis can help at times to reduce the period that a melt of steel is in the furnace. The Quantovac system and the older method of chemical analysis are at present being operated in parallel and it will be some months before the new system is in full production.

The foregoing information is published in a recent issue of *Iscor News*.

Electric Chain-block

Aabacas Engineering Company, Limited, of Birkenhead, have produced a "Powerlift" electric chain hoist, designed for a safe-working load of one ton, with a lifting speed of 20 ft. per min. Other specifications are: headroom from hook to hook, 20 in.; overall length, 19 in.; depth to centreline of hook, 8 in.; rear to centreline of hook, 13 in. A 12-ft. length of lifting chain is supplied. Control of the unit is by a push-button handle suspended from a rubber- (or P.V.C.-) sheathed cable. The main body is a one-piece steel casting, and the chainwheel is an amply proportioned, phosphor-bronze casting, provided with separate replaceable self-lubricating bushes. The main body of the hoist is designed so that it shrouds the chain wheel and prevents the chain from riding up in the pockets. There is an automatic adjustable self-resetting limit-switch for both top and bottom hook-positions. Including the hook suspension, the unit weighs 224 lb.

Cutting-off Machine

Addison Tool Company, Limited, Addison House, 28, Marshalsea Road, London, S.E.1, have introduced a design of metal-cutting circular sawing machine, model CEFMO AC.85, of French origin. Features claimed for the machine are a 360 deg. turntable which allows for any degree of mitre cut without moving the workpieces; adjustable backplates to give full support to the workpiece at either side of the blade; and an adjustable vice and vice support. A 12-in. dia., high-speed-steel sawblade rises from below the table and cuts mitres without run-out, allowing maximum use of sawblade diameter for slotting, etc.; the saw heads travel on a centre column; and an electrical suds-pump provides for continuous lubrication.

Rail Crane

George Cohen 600 Group, Limited, from Wood Lane, London, W.12, announce that the KL 12-20R rail crane is now in service. Fig. 1 shows one of these machines operating in the works of Colvilles, Limited. The lifting capacity is 20 tons at 10-ft. radius, using the standard 30-ft. jib, and a shunting capacity of 150 tons is quoted for the normal chassis designed

FIG. 1.—*Jones Model KL 12-20R operating at Colvilles, Limited, equipped with an electromagnet for handling scrap, pig-iron, etc.*

FIG. 2.—*Continuous clay washer developed by Harry W. Dietert Company, Michigan, USA.*

for this duty. The standard power-unit is a Perkins "Four 270D" diesel engine. The machine in use at Colvilles has been equipped with a 54-in. dia. electro-magnet to enable it to handle scrap, pig-iron and other ferrous materials. In this instance, a separate electrical generator for the magnet has been fitted, this being mounted on the left-hand side of the slewing superstructure. Alternatively, magnet equipment of smaller-capacity can be supplied, using a generator powered by the crane's own engine. Disconnection of the magnet to allow the crane to be used for general lifting duties is said to be quite simple. The new Jones KL 12-20R is built at Letchworth by K. & L. Steelfounders & Engineers, Limited.

Clay Washer

A foundry sand-laboratory clay washer (Fig. 2) has been developed and placed on the market by Harry W. Dietert Company, Detroit 4, Michigan, USA. The unit, known as No. 522, is based on the elutriation principle employing a vertically-moving flow of water to remove the particles finer than 20 microns. The sand is scrubbed continuously by a high-velocity jet of water from a motor-driven agitator tube and the clay is carried out of the vessel by the water flow as it rises to the outlet tube at the top. It is claimed that this method of continuous washing reduces the total test time by as much as one half for some production sands and eliminates the repeated syphonings required with the manual method and thus effects a considerable saving in operator time. (Ridsdale & Company, Limited, Newham Hall, Middlesbrough, are the UK agents for Dietert sand-testing equipment).

Pressure-die-casting Trials: Alexander Cardew, Limited, from 2, 3, & 5 Studio Place, Kinnerton Street, Knightsbridge, London, S.W.1, announce that trials of the new Triulzi 2,200 pressure-diecasting machine are imminent. The current plan is to put the 45-lb. "Volga" cylinder-block into production in Milan for a whole week during April, working day and night. It is expected that people from quite far afield, including the USA, will be journeying to witness the trials. Towards the end of March also in Milan a smaller (25-lb.) aluminium cylinder-block for the Skoda company will be tried out on a 1,500-ton Triulzi machine. Visitors will be welcomed at both events.

Level Indicator: A new instrument, known as the "Levelrator" for continuous indication of the contents of silos, tanks, hoppers, etc., has been introduced by Thomas Industrial Automation, Limited, Station Buildings, Altrincham, Cheshire; the unit will also operate visual and/or audible alarms, it is stated. One electrode only is used for both continuous measurement and control—electrodes are available up to 60-ft. long. The high- or low-level control units are completely independent of the indicating instrument, and relays are operated by a specially designed electronic circuit. The control unit, consisting of a stabilized power-supply, alarm relay-circuits and built-in calibrating instruments is housed in a cast-iron or sheet-steel weatherproof case. The calibrating instrument has a scale length of 2½ ft. and is graded in two per cent. divisions so that if necessary it can be used as a local indicator.

Industrial Tool: Firth Cleveland Tools, Limited, 7, Cleveland Row, London, S.W.1, have developed a new industrial version of their Surform tool for filing, smoothing and shaping such hard materials as mild steel, aluminium, copper, brass, etc. The tool's working surface consists of a perforated toothed "blue blade" of hardened and tempered tool-steel, which, it is claimed will stand up to long periods of continuous use. The body of this unit is of steel and there is fitted a removable forward guide-piece; alternative wooden file-type handles are available, straight or cranked.

Screwdriver and Nutrunner. A new torque controlled screwdriver and nutrunner incorporating a "magnamatic" clutch, known as the CP 3008 -LMS 1600, has been introduced by the Consolidated Pneumatic Company, Limited, 232, Dawes Road, London, S.W.6, to meet the demand for a tool which will eliminate damage such as stripped threads and distorted workpieces due to application of excessive torque during tightening of screws and nuts.

Moisture in Compressed Air: Shaw Moisture Meters, Rawson Road, Westgate, Bradford, announce a new type of dewpoint measuring unit for permanent installation to measure moisture in dry-gas or compressed-air lines. The manufacturers claim that the range of the instrument is such that no gas has yet been encountered in practice which is too dry for the moisture to be indicated and the range of the instrument is 150 deg. C. dewpoint.

Bulk Propane: A five-ton bulk propane-gas fuel-supply system has recently been installed at the Sheffield works of McCalls Macalloy, Limited, by the British Oxygen Company, Limited, for a stress-relieving and ageing furnace. The firing system consists of four oxy-propane ribbon-type burners muffled by silininite bricks; temperature is regulated by the speed of the work passing through the furnace.

Steel Industry's Optimistic Outlook

Mr. C. R. Wheeler, C.B.E., president of the British Iron & Steel Federation, speaking at the annual general meeting emphasized that although Britain's internal rate of growth is clearly governed by overall balance of payments limitations, detailed discussions by the Government and industry on future programmes and expectations might "remove some of the barriers to stable growth," and so "create an environment in which industry can unleash its full wealth-creating potential and plan for growth in greater assurance." Ways of limiting wasteful stock fluctuations should also be explored to this end.

The president pointed out that the recent increase in the price of coal had added some £19,000,000 annually to the steel industry's costs. This was leading to vigorous thinking on development planning in relation to fuel supplies and on ways of reducing its vulnerability as a captive market for British coking coal. Representations against the increase had been made on behalf of the Federation to the Industrial Coal Consumers' Council. The industry was threatened by further cost increases through the introduction of the Rating and Valuation Bill, particularly in regard to the wholly inequitable rating of process plant.

For 1961, the industry maintained an optimistic attitude and held to the view that crude-steel output in 1961 might reach a total of 24,500,000 ingot tons. It expected that activity in the investment field would remain high, that consumers would maintain their stocks of steel in face of current cost trends, and that the Government would ease credit restraint sooner rather than later in the year. It hoped that exports in 1961 would be on an even higher level than last year's record. Looking forward, the industry believed that demand will grow by 1965 to about 30,000,000 tons (as compared with 24,500,000 tons in 1960). Companies' plans already envisaged a steel capacity of 34,000,000 tons.

The steel industry, he said, welcomed the progress made with the European Free Trade Area but wider unity in Europe remained vital. The Federation had stated to the Government its belief that "the economic well-being of the United Kingdom, of the steel-consuming industries and of the industry itself would be promoted by a comprehensive and intimate relationship betwen the 'Six,' the United Kingdom and the other EFTA countries." For the good of its customers, rather than for any direct advantage, the steel industry would welcome closer unity with the six common market countries.

Re-opening of Coalbrookdale Works Museum

The Coalbrookdale Works Museum, established in 1959 by Allied Ironfounders, Limited, to commemorate the 250th anniversary of the founding of the Coalbrookdale Company, will re-open to the public on March 31.

Visitors to the Museum will be able to see the actual remains of the earliest days of the ironfounding industry, including the Old Furnace originally built in 1638 and used by Abraham Darby in 1709 when he first successfully smelted iron with coke; there will also be an extensive indoor display of exhibits depicting the history of the Coalbrookdale Company. The Museum, which is on the site adjoining the present works of the company in Wellington, Shropshire, will remain open until October 31—on Mondays to Fridays from 10 a.m. to 12 noon, and from 2 to 4 p.m., and on Saturdays from 2 to 4 p.m. Admission is free of charge.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

838,846. Stauffer Chemical Company, 38, Madison Avenue, New York, USA.

Vacuum melting and casting of conductive materials by electric discharges.

838,992. Imperial Chemical Industries, Limited, Imperial Chemical House, Millbank, London, S.W.1.

Preparation of moulds and cores in which they are hardened by the introduction of a fluid reagent, such as carbon-dioxide gas. The method is to pass the reagent into the mould or core material by means of at least one expansible permeable tube (which can be made of perforated rubber) which has been embedded therein.

839,276. Concast A.G., Stockerstrasse 33, Zurich, 2, Switzerland.

Apparatus for reciprocally raising and lowering the supporting table for a permanent mould, and of the mould connected with it, in a continuous-casting machine. (See also B.P. 840,014, not abstracted.)

839,556. J. B. Brennan, 13018 Lake Shore Boulevard, Cleveland 8, Ohio, USA.

Improvements in casting techniques. Molten metal is fed from a supply source into a cavity in a passage, the extremes of which are defined by two plugs. These plugs are moved to carry the material along the passage and to eject it from the passage in a shape-retaining form.

839,672. F. Miszczak, 3, Ellaline Road, Fulham, London, S.W.6, and A. I. Speculand, 45, Forestdale, Southgate, London, N.14.

The casting of ornamental metal objects. The manufacture of jewellery, such as cuff links, is claimed, but the invention is not restricted to this end use, but may be improved for the manufacture of a wide variety of articles in which a pattern is required on one face in a metal different from that of which the ornamental part is made.

839,733. Oglebay Norton Company, 1400 Hanna Building, Cleveland, Ohio, USA.

Bottom rings for composite hot-tops. The practice of this invention is stated to result in the reduction of the inventory of wiper strips, and the elimination of waste due to wipers being carelessly thrown aside, because too many were picked up for the preparation of the hot-tops. In Patent **839,739,** this company also claims a refractory bottom ring for application to a hot-top of the type to be set into the cavity of an ingot mould.

839,866. Badische Maschinenfabrik A.G., Sebodlwerk, Karlsruhe-Durlach, Germany.

Counter-pressure heads for moulding machines. The objective of these is to ensure that the sand is uniformly compressed. The negative patterns of the head are secured to a plate which turns about a vertical axis in synchronism with the rotatable frame of the turntable moulding machine.

Mr. L. J. TOLLEY, works director, Renold Chains, Limited, Wythenshawe, Manchester, has been appointed a deputy managing director in addition to Mr. W. S. C. TULLY. Mr. E. E. HEMPSALL has been appointed general works manager to succeed Mr. Tolley.

Personal

Mr. E. L. PIPE has joined F. W. Berk & Company, Limited, London.

Mr. A. W. GIRLING has been appointed a director of Aveling-Barford, Limited.

Mr. ALFRED NEATE has been appointed a director of Harper Engineering & Electronics, Limited.

Mr. T. H. WHITEHOUSE has joined Spenhouse Developments, Limited, Birmingham, as a director.

Mr. J. E. YATES has been appointed to the board of Lancashire Dynamo & Crypto, Limited, a member of the Metal Industries group.

After 37 years with the company, Mr. J. W. MARTIN, director and sales manager of Whessoe, Limited, Darlington, is retiring at the end of the month.

Mr. D. A. FARRAR, assistant managing director of Ormerod Shapers, Limited, has been appointed a director of Kitchen & Wade, Limited, Halifax.

Mr. J. H. MILTON has been appointed principal engineer surveyor of the North East coast area of Lloyd's Register of Shipping in place of the late Mr. R. SHAW.

LORD MCCORQUODALE OF NEWTON has been re-elected president and Mr. E. J. HUNTER and Mr. J. MAURICE LAING, vice-presidents of the British Employers Federation.

Prof. Dr. Ing. E. H. HEINRICH NORDHOFF, president of Volkswagen AG., has been elected a director of August Thyssen-Hutte in place of Dr. KLAUS DOHRN, who has resigned.

Mr. INGE STENBERG, a director of S.K.F. Aktiebolaget Svenska Kullagerfabriken, has been appointed an additional director of its subsidiary, the Skefko Ball Bearing Company, Limited.

Mr. G. R. H. TROLLOPE, former London manager of Aiton & Company, Limited, pipe engineers, of Derby, has joined the engineering firm of Mathew Hall & Company as sales executive.

Mr. J. P. BOVILL has been appointed managing director of Wolf Sales Pty., Limited, of Homebush, New South Wales, Australia, an associated company of Wolf Electric Tools, Limited.

Mr. JACK BAKER, managing director of Danite Hard Metals, Limited, a subsidiary of British Ropes, Limited, has been elected chairman of the Doncaster section of the Institute of Production Engineers.

Mr. RONALD KINSEY has been appointed representative in North America for the Export Credits Guarantee Department, following the retirement of Mr. CLIVE EBORALL. Mr. Kinsey will operate from New York, c/o the British Consulate-General.

Mr. E. V. DEWHIRST, chief metallurgist of Specialloid, Limited, Leeds, has been awarded the Insignia Award of the City and Guilds of London Institute for his thesis on "Surface Treatment of Piston and Liner Assemblies for Internal-combustion Engines."

Mr. HAROLD BOWLEY, works manager of John Smith & Company (Derby), Limited, brassfounders and engineers of Cotton Lane, Derby, has completed 50 years' service with the firm. He started as stores boy, and was appointed to his present position in 1938.

Mr. PETER J. WRIGHT has joined the marketing division of Massey-Ferguson (United Kingdom), Limited, Coventry, as general sales manager. Mr. Wright, who is 33, was formerly manager of the truck sales department of the Ford Motor Company, Limited.

Mr. ERIC S. GREENWOOD has rejoined Sir W. G. Armstrong Whitworth Aircraft, Limited (a member of Hawker Siddeley Aviation, Limited), as technical sales manager. His transfer from the international sales team of Hawker Siddeley Aviation was effective from March 1.

Mr. C. F. PAGNAMENTA has been appointed a director of G.K.N. Steel Company, Limited. He continues as company secretary. Mr. A. T. HARRIS has been appointed a local director of Brymbo Steel Works, Limited, and Mr. T. DENNISON has been appointed a local director of Guest Keen Iron & Steel Works, Limited.

Mr. C. W. STEWART, director and general manager of Charles W. Taylor & Son, Limited, ironfounders, South Shields, is retiring on March 31. He will be succeeded as general manager by Mr. CHRISTOPHER NICHOLLS, formerly foundry manager with the North Eastern Marine Engineering Company, Limited, Wallsend-on-Tyne.

VISCOUNT AMORY OF TIVERTON has been elected a director of the Steel Company of Wales, Limited. Lord Amory who resigned as Chancellor of the Exchequer last year, is a director of John Heathcoat & Company, Limited, and Lloyds Bank, Limited. He is also a non-executive director of Imperial Chemical Industries, Limited.

Mr. EDGAR STOTT, export sales manager of Turner Brothers Asbestos Company, Limited, retires at the end of this month after 42 years' service with the company. He is succeeded by Mr. J. C. T. FELL, until recently export sales manager of Ferodo, Limited, Chapel-en-le-Frith, a sister company of Turners in the Turner & Newall organization.

Mr. J. CARLE has been appointed managing director of George Richards & Company, Limited, a member of the Staveley Industries group. A former works director of Tilghman's, Limited, also a member company, Mr. Carle was appointed a director of George Richards in 1958, and deputy managing director later that year. He holds directorships in a number of companies in the group.

Mr. ANTHONY M. BROWNE has been elected president of the British Electrical and Allied Manufacturers' Association. Mr. H. H. MULLENS has been elected deputy president. Mr. Browne is chairman and managing director of Hackbridge & Hewittic Electric Company, Limited, and Mr. Mullens is chairman and managing director of A. Reyrolle & Company, Limited, and chairman of C. A. Parsons & Company.

Last week, Mr. SANS, the president of the International Committee of Foundry Technical Associations paid a semi-official visit to the Institute of British Foundrymen in London. He was accompanied by PROFESSOR ANDREAS, honorary organizer of the 1959 International Foundry Congress in Madrid. The visitors were received by the president of the Institute, Mr. G. R. SHOTTON, the vice-president Mr. D. A. RICHARDS, past-presidents, Mr. V. C. FAULKNER and Dr. A. B. EVEREST, Mr. M. M. HALLETT and the secretary, Mr. G. LAMBERT.

Smokeless Fuel Policy

An open meeting of the Women's Advisory Council on Solid Fuel, held last Thursday at the Royal Institute of British Architects, London, was addressed by Mr. Derek Ezra, Director General of Marketing, National Coal Board. He was supported by the Rt. Hon. Alfred Robens, the chairman of the Board, Sir John Charrington and Dr. W. Idris Jones, C.B.E.

In the course of his address Mr. Ezra said that it was not only legislation but public preference which was stimulating the demand for smokeless fuels, and this demand was by no means restricted to smoke control areas. The Beaver Report had proposed that some 19,000,000 tons of bituminous coal burned each year for domestic purposes would have to be replaced by smokeless fuel during a period of 10 to 15 years. In the five years since the Clean Air Act was passed about 470 smoke-control areas had been confirmed involving a demand for only three quarters of a million tons or so of smokeless fuel. One of the reasons given by some local councils for not proceeding faster with smoke-control areas was the apparent lack of satisfactory smokeless fuels. The Beaver Report had assumed that the brunt of the conversion from bituminous to smokeless fuels would be taken by gas coke, but consumers in many parts of the country were expressing a preference for the premium fuels (such as Coalite, Rexco, Cleanglow, and Phimax), produced by the gas industry and other producers. The amount of these fuels was not yet sufficient to satisfy the public demand, even though the tonnage has been increasing in line with the indications given in the Peech Report (from about 750,000 tons in 1958 to an estimated 1,500,000 tons in 1961). It was reasonable to assume that the producers of these fuels would continue to add to their outputs in the next few years. The Coal Board would also be making a major contribution.

New Smokeless Fuel

The Board's hopes lay, said Mr. Ezra, in the new smokeless fuels for the open fire which had reached the pilot plant stage in the Midlands and in South Wales. The main process being developed was revolutionary, and could be applied to a large range of the coals produced in this country. The Board were now at the point of distributing products of the pilot plants for market trial, and had put in hand design work for building commercial scale plants. The Board hoped, said Mr. Ezra, that within two to three years the products of the first plant would be reaching the market in fair quantity, and by 1965, when other commercial plants would be getting into their stride, the output of smokeless fuels will have topped the million mark.

The Board were confident that their new fuel would meet entirely the requirements of the Clean Air Act, and they would thus be able to play their part in attaining the objectives laid down in the Beaver Report with a fuel which was still in the early research stage when that Report was prepared. The problem of finding a substitute fuel for the open fire should not be allowed to mask the development which was taking place in other forms of domestic solid-fuel heating and he referred to the important contribution which could be made by the openable or closed stove. The Board were aware of the preference which existed in favour of the open fire, but the new types of stoves, particularly the openable kind with glass doors or shutters which were so attractive, should appeal to most housewives. These stoves had two advantages: they were more efficient than even the improved varieties of open fires; and they could burn a much wider range of smokeless fuels, including the Board's special boiler coke which was now marketed under the name of "Sunbrite."

It was a great disappointment that local authorities, when making grants in smoke-control areas did not extend these to cover the purchase of heating stoves. He hoped that some local authorities might be prevailed upon to take a more generous view of the matter and suggested that householders undertaking conversions in smoke-control areas should be encouraged to purchase these stoves through the Board's housewarming plan, and use the grant they received from the local authority as a first instalment.

Other Forms of Heating

Turning to other forms of heating Mr. Ezra said that the Board were convinced that they would be able to channel a large part of the growing interest in central heating in the direction of solid fuel. The Board now marketed about 2,500,000 tons a year of various sorts of boiler fuel. Year by year they would be adding to these tonnages. The big new anthracite pits in South Wales were now producing; more "Phurnacite" was being made; there would be plenty of "Sunbrite"; and they were conducting experiments with anthracite duff and should be able to produce a satisfactory and long-lasting fuel from that product.

The Board were not limiting themselves to the provision of the fuels required for domestic boilers. They had also taken steps to ensure that boilers would be developed, and this, he explained, meant meeting the challenging problem of devising a solid-fuel boiler which would be as easy to run, as automatic, and as a labour saving, as the boilers currently marketed for oil firing. By the next heating season a number of the new boilers would be available to the public with novel features which would considerably cut down labour in the home. Further big strides would be taken in the following year and he was convinced that ultimately the domestic consumer would be able to obtain a solid-fuel-fired boiler which would involve no more labour than simply turning on a switch, and adjusting one or two controls. This was not science fiction; it was just around the corner.

In the course of the discussion, a plea was made to manufacturers of equipment that the design of anthracite-burning stoves should be made more flexible to enable them to burn other fuels.

Safety Exhibition

A Safety Exhibition where every aspect of safety at work, at home and on the roads will be featured, has been organized by Kodak, Limited, Wealdstone, Harrow, Middlesex. The exhibition will be held in the K.R.S. Hall at the Kodak Factory, from 12.45 to 9 p.m., on Monday, May 1, and from 9 a.m. to 9 p.m. daily thereafter until Saturday, May 6. The organizers have set out to show how things should be done safely and to illustrate the dire consequences that may result from hasty or ill-advised actions.

A series of films will be shown regularly throughout the exhibition, and industrial aspects demonstrated will include fire prevention, noise suppression, safety clothes and footwear, fume and dust extraction, mechanical handling, medical facilities, etc. Admission to the exhibition is free of charge.

SPENCER GEARS, LIMITED—Mr. C. H. Spencer and Mr. J. W. L. Schofield have been appointed directors.

Book Reviews

Physical Examination of Metals. Edited by Bruce Chalmers, D.SC., PH.D., and A. G. Quarrell, A.R.C.S., D.SC., F.I.M. Published by Edward Arnold (Publishers), Limited, 41 Maddox Street, London, W.1; price £8 8s. net.

This is a well-produced book containing 17 chapters on the principal physical techniques (except radiography) now employed in the examination of metals. It is written by 16 different authors and there is a final and valuable chapter describing general techniques to be used when conducting high-vacuum research work. Nine of the authors are employed in teaching establishments and the approach may be said to be somewhat academic. The book contains 900 pages with line and half-tone illustrations and references at the end of each chapter, and is correspondingly expensive.

The foundryman will wonder what it contains for him. If he turns to the "subject index" which occupies 13 pages, he will get the impression that it is the techniques themselves which feature most prominently and he has to run through sub-headings in many cases to find his metallurgical points. Castings are not indexed as such but p. 686, under ultrasonic testing, deals with defects in cast-aluminium slabs. Cracks are given several references and on p. 720 we learn that they are revealed by magnetometer methods, with a mention that the depth of case hardening can also be measured. Does this also apply to the depth of chill on a chill-roll? The reviewer has not been able to find any information in the book on this point, though coatings as such are dealt with fairly thoroughly.

Electrical methods to detect cracks are outlined on p. 155 and a mention of the use of ferromagnetic testing to show draw cracks in castings has been discovered on p. 698. Porosity is not indexed but dealt with under "ultrasonics," and as for internal stresses, a search of likely parts of the text gives information under X-ray diffraction, on "Effects due to Elastic Strain"; more is also to be found under "Magnetic Stress Analysis" on p. 247. All this means that the two Editors in directing the work decided to view it as providing information primarily for the physicist. This it does very well, even tersely telling him in the chapter on radioactive isotopes, that they can be applied to foundry sands and mould paints. But for the foundry technologist the book is a luxury.

H. O'NEILL.

Basic Synchros and Servomechanisms, Part I and II, developed for the US Navy by Van Valkenburgh, Nooger & Neville, Inc. Published by the Technical Press, 112 Westbourne Grove, London, W.C.2: price 14s. per part.

This publication follows the same pattern as the earlier volumes in this series, *viz.*: "Basic Electricity and Basic Electronics." Approximately the first third of the work under review is devoted to synchronized mechanisms and the remaining two thirds to servomechanisms. In regard to the former, outline accounts are given of the principles underlying synchro' torque-transmitters and indicators, the synchro' differential and capacitor, and ancillary equipment. Servomechanisms are described in considerable detail; the basic fundamentals are first described, and then the reader is led to a deeper understanding of error-detecting systems, controlling systems using either d.-c. or a.-c. equipment, and finally an account is given of means of combating error in servo systems.

As in the earlier volumes in this series, the publication which is the subject of the present review is fully illustrated with diagrammatic sketches of equipment and electrical-circuit diagrams; both parts are provided with an index, Part II having a cumulative index.

Without doubt, these volumes will be found very useful for the training of technicians concerned with the operation and servicing of process-control equipment. This is emphasised by the fact that although this book—like the earlier volumes in the series—was produced primarily for the training of Service personnel, it is now widely used by a number of non-Service organziations for the training of their staffs.

J. E. GARSIDE.

Catalogues

Electric Furnaces. General Electric Company, Limited, of England, Erith, Kent, have issued three publications covering different types of electric furnaces. No. E 75 deals with roller hearth furnaces, which are used for the continuous heating of components in air or a controlled atmosphere. One of these is over 400-ft. long and is powered by 2,000 kw. No. E 78 covers the field of high-temperature furnaces—up to 2,500 deg. C.—for heat-treatment purposes. The furnaces operate under a hydrogen atmosphere to prevent the oxidation of the molybdenum and tungsten heating-elements. Induction heating furnaces are dealt with in No. E 67, and this publication describes mains, medium and dual-frequency units supplied for heating and reheating of ferrous and non-ferrous alloys.

Dust Collectors. Sturtevant Engineering Company, Limited, Southern House, Cannon Street, London, E.C.4, in publication No. 6904 (which supersedes No. 6903) illustrate a high-efficiency cyclone dust-collector. Wisely, the information required for tendering is set out on the last page. In another Sturtevant publication "Heating and Ventilating" (No. 4104, superseding No. 4101) good technical descriptions are given of plants installed by the company. All are well illustrated and some good comparative data are included.

Industrial X-ray Equipment. Kodak, Limited, Kingsway, London, W.C.2, have now issued their 1961 catalogue which gives information about the salient features, prices, sizes, and stock availability of industrial X-ray materials and equipment, from films and chemicals to exposure and processing equipment, etc. The catalogue is clearly set out and well illustrated and contains, in addition to the above, details of the Kodak School of Industrial & Engineering Radiography.

Hot-metal Receivers. A six-page, well-illustrated folder received from Monometer Manufacturing Company, Limited, Savoy House, 115/116, Strand, London, W.C.2, details the construction of hot-metal receivers which the firm manufactures and tells something of the economics achieved through their use. The units can be either oil- or gas-fired and can be supplied fixed or mobile.

Sports Requisites. The En-Tout-Cas Company, Limited, Syston, Leicester, has recently issued its 1961 price list for sports and garden accessories. As nowadays so many of the large foundry concerns operate sports clubs, a copy of this catalogue should be available in the purchasing office for consultation by the various committees.

News in Brief

EXACTOR, LIMITED, have moved from Edgware and their new address is Sterling Works, Blacknell Lane, Crewkerne, Somerset.

A 1961 CALENDAR received from the Indian Iron & Steel Company, Limited, carries an impressive picture in colour of the firm's Morgan continuous merchant and rod mill.

THE FEDERATION of British Rubber and Allied Manufacturers has moved its offices to 19/20 Berners Street, London, W.1; the telephone numbers, MUSEUM 2671 and 0268 remain unchanged.

TWENTY-SEVEN APPRENTICES of the East Midlands Gas Board were presented with certificates and indentures by the deputy chairman, Mr. E. H. Harman, at Sheffield City Memorial Hall on March 20.

AT A RECENT SOCIAL FUNCTION held in the New Crown Hotel, South Shields, 34 employees of Charles W. Taylor & Son, Limited, North Eastern Foundry, South Shields, were presented with gold watches by the chairman, Mr. C. N. Storey, in recognition of 25 years' service.

TWELVE MEN were injured in an explosion at Parkhead Forge, Glasgow, last week when a 60-ton casting blew up, six being detained in hospital. The men were standing on scaffolding, working at the casting, when the explosion occurred, and some of them were hurt jumping clear.

HOUSINGS FOR THE slabbing mills for the Spencer Steelworks of Richard Thomas & Baldwins, Limited, are due to arrive at Newport (Mon), docks on April 24. They are being imported from the US, where they were manufactured by the United Engineering & Foundry Company, Pittsburgh.

NINETEEN MEMBER-FIRMS of the Scientific Instrument Manufacturers' Association of Great Britain will exhibit 500 instruments worth £220,000 at the British Trade Fair to be held in Moscow from May 19 to June 4. The exhibits will be on the SIMA joint stand in Hall C adjacent to the British Government's display.

NEW DIAMOND drilling division has been formed by Coventry Compressors, Limited, hirers of contractors' plant, of London, S.W.8, to deal exclusively with the problems of penetrating the harder materials used in construction and installation work. Mr. T. K. Jenkins has been appointed manager of the new division.

FLOATING CRANE has lifted the first of two 140-ton castings from the hold of the British coaster Lurcher which sank in the River Mersey in January after a collision. The castings, steel mill housings, were made by the English Steel Corporation, Limited, and machined by Davy United, Limited, for Colvilles, Limited.

STANDING COMMITTEE has advised the Board of Trade that imported heat-insulating bricks should bear an indication of origin at the time of importation and exposure for sale. The recommendation also covers blocks, tiles of infusorial earths, of diayomaceous earths, of kieselguhr, of siliceous fossil meal or of similar siliceous earth.

PART OF THE EQUITY of the Leobersdorfer Machinen Apparate und Werkzeug-Fabrik (MAW), of Austria, has been acquired by Atlas Copco, AB, of Stockholm, which has also concluded a licence agreement with the Austrian company. Main objective of the venture is to increase sales to South-east Europe where MAW has already been awarded several substantial contracts.

BROOK MOTORS, LIMITED, are stepping up production at their Barugh Green works, Barnsley, as they bring a new factory extension into use. Employment is being found for an additional 75 workers engaged in the manufacture of electric motors for domestic appliances. The remainder of the factory employees, numbering 600, are continuing the manufacture of equipment for industrial use.

AMERICAN CONCERN, the Olin Athieson Chemical Corporation, believes that aluminium can be made from ordinary clay as cheaply as from bauxite, the commonly used source of the metal. Dr. W. E. Hanford, the vice-president for research, said that preliminary laboratory work had been encouraging, production costs were competitive, and plans were under way to further evaluate the process.

SIX EXPORT MANAGEMENT firms set up a committee in London last week to investigate the advantages of forming an Association of Export Management to provide services to small potential exporters. The Association's aim would be to act as a centralized body assisting export management firms to open new accounts with manufacturers, and supply exporters with names of members suited to carry out their particular business.

MORGAN CRUCIBLE COMPANY, LIMITED, announces that on completion of its reorganization plans on April 1, the company will cease to trade and its product departments will become, or become part of, new subsidiary companies. Orders should be placed with the appropriate subsidiary companies. For instance, orders for crucible furnaces and foundry accessories will be handled by Morganite Crucible, Limited, Norton Works, Woodbury Lane, Norton, Worcestershire.

BY A NEWLY COMPLETED AGREEMENT British Insulated Callender's Cables, Limited, will act as distributors to the electrical industry in Britain and Northern Ireland of fibre-reinforced resin materials manufactured by Thermotank Plastic Engineering, Limited, Chapelhall (Lanarkshire). The agreement is the outcome of several years of collaboration between the two companies to develop reinforced plastic materials which combine high insulation performance with great tensile strength.

A 250-PAGE REPORT on the conference on "Getting the Best out of Coal," held by the Combustion Engineering Association at Harrogate on November 8 and 9, 1960, is now ready and can be obtained price £1 post free from the Association, at 70, Jermyn Street, London, S.W.1. Following an opening address by Dr. C. M. Cawley, chief scientist, Ministry of Power, papers by leading authorities examine from both the technical and economic aspects, the choice of coal allied to the selection, operation and maintenance of equipment for industrial furnaces, kilns and boiler plants in order to achieve savings in capital and operating costs. Discussions at the conference are fully reported.

SALES AT LOWER AVERAGE PRICES of a five per cent. greater output from Northern Rhodesia's mines have meant increased prosperity for the industry as a whole and for the mining workers during 1960. Output, valued at £128,700,000 at free-on-rail-at-mine prices, was about £9,000,000 higher than in 1959, despite a drop in copper, the Protectorate's principal mineral product. The industry employed only two per cent. more workers for the five per cent. increase. According to figures released by the Ministry of Labour and Mines in the Protectorate, copper output

News in Brief

contributed £121,100,000; cobalt, £2,300,000; zinc, £2,700,000; lead, £1,000,000; manganese, £750,000; and limestone £500,000, during the year.

METAL INDUSTRIES, LIMITED, announce that their marine salvage subsidiary, Metal Industries (Salvage), Limited, will cease operations from March 31, as the company had become increasingly uneconomic in recent years and no likelihood of any improvement was foreseen. About 60 employees are affected, but wherever possible alternative employment will be offered to them in Shipbuilding Industries, Limited (another Metal Industries subsidiary), or in other companies in the group. Metal Industries (Salvage), Limited, maintain two rescue vessels, Metinda II and Plantagenet, both of which will now be sold. Shipbuilding Industries, Limited, will take over the company's headquarters at Faslane, Gareloch, which they share at present.

AWARDS FOR THE SAFETY COMPETITION, launched by the safety committee of the George Cohen 600 Group, Limited, last year, were presented on March 7 at the Wood Lane, London, headquarters of the group by Mr. Cyril M. Cohen, group chairman. Trophies went to the Neasden (London) depot of the reinforcement department of T. C. Jones & Company, Limited, and to the erection department of Dunlop & Ranken, Limited, Leeds, both of which achieved the record of no time-losing accidents during total working hours of 86,800 and 71,000 respectively. The company reports that one-third of their total accidents occur in the physical handling of steel. In 1959 group accident-frequency rate was 4.7, in 1960, the first year of the competition, it was reduced to 3.8.

HOME SALES CONFERENCE of Thomas Smith & Sons (Rodley), Limited, held at Rodley recently, was opened by Mr. Arnold Carr, chairman of the company. After welcoming members, Mr. Carr said that a buyer's market now existed and the easy days when any manufacturer could sell almost anything had gone. In his view, the outlook for the future was to "sell more, and work harder for less money." This did not necessarily mean "a tightening of belts," but was more in the nature of a warning that, throughout the world, conditions were leading to intensified competition and must be met by intensified effort. The conference lasted three days and included technical lectures on the company's new developments and an intensive course on sales research and promotion.

Company News

Doxford/Sunderland Merger

The terms were announced last week of the merger foreshadowed early in January between William Doxford & Sons, Limited, shipbuilders and engineers, of Sunderland, and the Sunderland Shipbuilding Dry Docks & Engineering Company, Limited. Doxford is to offer five of its £1 ordinary shares for every six Sunderland £1 shares. Based on last week's price of 84s. for Doxford units, the exchange offer is worth a total of £5,250,000.

The Sunderland directors intend to accept in respect of their individual holdings, and to recommend the offer to shareholders. The question of extending the proposals to cover the existing preference capital of Sunderland is being examined. Upon the merger becoming effective there will be a change in name of the Doxford company and a number of the Sunderland directors will join the Doxford board.

BRITISH OXYGEN COMPANY, LIMITED—An extraordinary meeting is to be held in May to create capital and effect a one-for-two scrip issue.

FEDERATED FOUNDRIES, LIMITED—Profits for 1960 have risen by 34.9 per cent. to £439,174 (£325,431) and the dividend is increased to 20 (17½) per cent.

BRUCE PEEBLES & COMPANY, LIMITED—A loss of £149,658 in 1960 against a previous profit of £46,896 is reported, and no dividend is recommended on the ordinary shares against 10 per cent. for 1959.

HALESOWEN STEEL COMPANY, LIMITED—A final dividend of 9 per cent. is announced, making a total for 1960 of 13 (11½ equivalent) per cent. After tax of £54,500 (£40,100), the net profit of £50,820 compares with £40,313.

OPPERMAN GEARS (HOLDINGS), LIMITED—Dividend for 1960 is raised by 2½ per cent. to 17½ per cent. Group net profits rose from £37,505 to £47,381 after tax of £35,833 (£29,500).

A. A. JONES & SHIPMAN, LIMITED, machine and small tool manufacturers, of Leicester—A second interim of 27½ per cent., in lieu of a final dividend, makes a total of 35 (30) per cent. for 1960. A one-for-one scrip issue is proposed. Trading profit expanded from £287,862 to £424,653 and net profit to £195,421 (£126,121).

A. P. V. COMPANY, LIMITED, makers of stainless steel and alloy plant and vessels, of Crawley (Sussex)—The dividend is being raised from the equivalent of 7.1 per cent. to 11¼ per cent. on capital increased by a one-for-five scrip issue, for 1960. Profits expanded from £495,893 to £750,235 and the net group profit balance is up to £350,151 (£243,944).

WOLF ELECTRIC TOOLS, LIMITED—Group profit for 1960 increased to £308,181 (£277,326) before tax of £148,419 (£140,000), and the dividend is to be stepped up to 13¾ (12½) per cent. It is proposed to make a one-for-eight rights issue, the proceeds of which will be utilized in financing the purchase of the factory adjoining the company's main premises at Ealing.

HALL-THERMOTANK, LIMITED—The board is to close down Thermotank (Canada), Limited, the chairman, Mr. J. F. E. d'A. Willis, said at the annual meeting on last week. As regards Thermotank Inc., of the US, and J. & E. Hall (Canada), Limited, neither company had yet turned the corner, but their expected losses during the year would be considerably less than last year, he said.

SKEFCO BALL BEARING COMPANY, LIMITED—Net profit increased from £829,749 to £1,004,007 for 1960, after tax of £1,451,000 (£1,271,550). A final dividend of 9½ per cent. is announced, making a 12 per cent. total dividend, compared with the previous equivalent, adjusting for a scrip issue and including a 1½ per cent. jubilee bonus paid out of surplus in tax account, of 10⅞ per cent.

A.E.I.-BIRLEC, LIMITED, furnace manufacturers, of Birmingham—To cover its markets in Australia, New Zealand, and South-east Asia, the company has made an agreement with Major Electric Furnaces Pty., Limited, Melbourne, Australia, to create a company to be known as Birlec-Major Pty., Limited, in Australia. The new company will make all types of electric and gas-fired furnaces for heat-treatment and melting processes at present built by Birlec and its UK associate companies. Birlec furnaces have previously been made by Major Electric under licence since 1952.

News from South Africa

Apprenticeship Recommendations

Because an apprentice has certain technical certificates it does not necessarily mean that he is more competent in the practical field, says the report of the South African National Apprenticeship Board, published recently. The report recommends that the present system of promoting an apprentice to the artisan ranks more quickly because he has a certificate should be abolished. A new scheme suggested by the Board would permit an apprentice with these technical or academic qualifications to take the voluntary trade test some years before his normal training period ends, and on passing the test he would immediately get artisan status.

New Deal: At present, the apprentice can only take this test at the end of the penultimate year—four years when he is indentured for five. Under the suggested "new deal" he could take it within a minimum period of 2½ years, depending on his trade. In the event of failure he would work out his full time like every other apprentice. Under certain circumstances, he might be allowed another try at the voluntary test, say, after four years.

Compulsory Test: All apprentices, barring those who have passed the voluntary test, would enter a compulsory test at the end of their time. If they fail this hurdle, they must serve a further year's apprenticeship after which they qualify as artisans "by effluxion of time."

The recommendations in the report are in some instances quite far-reaching; they are, however, the product of fairly unanimous views among employers and the trade unions.

Important Change: Another important change recommended involves study by apprentices in the employers' time. At the end of each year the technical college or school involved would give them the authority to do another year of study in working time. But if, in the opinion of the authorities, they were not using their time to good purpose, then they would not have this privilege.

A further recommendation which calls for special inspectors to see that employers give apprentices adequate training is certain to come into force, since informed sources state that these recommendations are among those already accepted by the Minister of Labour.

Air Pollution

In an effort to combat pollution of the air in the Union's cities, the South African Government is seeking the co-operation of industry, local authorities and other organizations in a national research programme. An Air Pollution Bill has been published in the "Government Gazette" and was placed before Parliament in February.

To "put teeth into their campaign" the Government have undertaken to add £1 to every £2 contributed to an Air Pollution Research Programme Fund, up to a maximum of £5,000 per annum. The Johannesburg City Council has already given £1,500, Durban a similar amount and other local authorities smaller sums in a desire to overcome this growing problem. The Chamber of Mines has made an initial offer of £250 a year for five years, on the understanding that there is general support for the fund. The steel and engineering industries have also given £250 and the Anthracite Producers' Association has agreed to contribute to the fund. The Government programme is being administered through the Council for Scientific and Industrial Research.

Law Cases

Gas Explosion after Shutdown

Damages totalling £150, of which £86 were special damages, were awarded to Mr. Emrys James Kenvyn (56), a heater at the Ebbw Vale works of Richard Thomas & Baldwins, Limited, by Judge Rowe Harding at Blackwood (Mon), County Court. Mr. Kenvyn claimed damages from the company for injuries received in an explosion at the company's works in August, 1958.

It was stated that when lighting up the soaking pits after the annual holiday, there was an explosion of gas, causing burns on his face and neck. The company stated that nothing like it had occurred at the works before.

The judge put 80 per cent. responsibility for the accident on the company, and 20 per cent. on Mr. Kenvyn. He said that a valve was left open after the shutdown. Since the accident, the company had laid down a written system for lighting the furnaces after a shutdown.

Crane Cabin Out of Repair

An appeal by the Llanelly Steel Company (1907), Limited, of Llanelly (Carmarthenshire), against a decision of Judge Trevor Morgan at Llanelly County Court on July 19, 1960, awarding £250 damages to an employee, Mr. Frederick Laurence Andrews, for rib injuries suffered in an accident at work in June, 1958, was dismissed with costs by the Court of Appeal.

Mr. Andrews, a crane driver, slipped and fell against the half-open cabin door of a crane as he was about to enter it. The company had denied negligence and breach of duty.

The Master of the Rolls, Lord Evershed, said he was not prepared to differ from the judge's finding that the door being stuck in that position, was out of repair and formed an obstruction, and that Mr. Andrew's injuries flowed directly from his impact with that obstruction. Lords Justices Upjohn and Pearson agreed.

British Standards Institution

British Standards Institution announces publication of a new edition of British Standard L.100: Inspection and testing procedure for aluminium and aluminium alloys (for aircraft). Principal changes in the standard—which now bears the reference 2 L.100 instead of L.100—are new tolerances specified for the various forms of product covered by the standard; metric equivalents and tolerances are introduced, with requirements for their use; requirements for controlled stretching of bars and extruded sections are also introduced; and the head forming test for wires for rivets is replaced by a torsion test.

The numerous related standards for aluminium alloys are also being brought up-to-date. Revision of these is still proceeding and 23 new and revised standards have already been published; none of those as yet refers to casting alloys. BS.2 L.100 costs 25s. and individual standards 2s. 6d. each; copies are available from the sales branch of the Institution at 2, Park Street, Lonon, W.1.

Mr. HORACE CAWLEY, Sheffield area sales manager, Union Carbide, Limited, Alloys Division, has been presented with a gold watch in recognition of 25 years' association with the company.

Raw Material Markets

Iron and Steel

Production of pig-iron is maintained at substantial levels and is now running at an annual rate of between 15,000,000 to 16,000,000 tons, the February output figure being approximately 15,750,000 tons. Of this tonnage basic pig-iron forms the major portion—over 80 per cent.—of overall outputs. Generally it is being fully absorbed by the steelworks, although outputs are controlled by the demand, and additional quantities arising in certain areas are transferred to meet the needs of consumers elsewhere.

The foundry grades of pig-iron are also being produced in adequate quantities and deliveries could be increased if the call warranted. Producing furnaces are carrying fairly good stocks and overall outputs are not being fully absorbed. This applies particularly to the high phosphorus irons demand which, although steady, shows no appreciable increase on recent tonnages. There continues a substantial request for the low phosphorus irons, and recently this has shown an increase on account of the bigger call for castings from the motor-car makers. Hematite is also in good demand, and refined iron makers are disposing of reasonable tonnages.

The increased usage of castings by the motor car trade continues to benefit the engineering foundries catering for them, and much more favourable trading conditions are now being enjoyed. The call for castings for commercial vehicles is sustained at high levels, and although the current delivery schedules from the motor industry are not up to the tonnages previously requested they are sufficient to enable most of the supplying foundries to work a full normal week. Other establishments producing high-quality castings are also well occupied, and the demands from many consumers are at good levels.

From the building trades the call for light castings continues at reasonably good levels, and the foundries supplying them are able to obtain fairly satisfactory outputs. Business continues scarce from the domestic utensil trade, and in consequence the light foundries concerned show little change in their outputs, which for some considerable time have been much below capacity levels.

The foundries are fairly well provided with most types of scrap, although demands for the heavier and better qualities of cast-iron scrap are not so easily satisfied. Foundry coke deliveries are satisfactory and ganister, limestone, and firebricks are in good supply.

The re-rollers continue to obtain fairly good outputs of their products. The arrears of work on hand for small bars and light sections are almost cleared, and the amount of business now being placed is not sufficient to restore order-books to the same levels. For strip and bright drawn bars the demand appears to be improving, due no doubt to the increased usage by the motor industry, but there is still need for a bigger overall demand from the re-rollers if their plants are to be kept fully employed. There continues a heavy demand from the mills producing reinforcing rods and bars.

The call for steel semis from the re-rollers, particularly those in the Birmingham and south Staffordshire areas is at a low ebb and is likely to continue so until present stocks are reduced; these include good quantities of imported billets, etc. The re-rollers are well provided with mild steel semis and are not taking up fully the tonnages which are on offer from home steelworks. More difficulty is experienced in obtaining the required supplies of carbon and alloy steel billets. The re-rollers continue to accept all the suitable re-rolling defectives and crops which arise at the steelworks.

Non-ferrous Metals

Tin is a firm market in Singapore, London, and New York. The statistical position is good, demand is steady, and available supplies are not so plentiful that large buying orders would be easy to execute. Indeed, it is now generally felt that stocks in the hands of US consumers are low and should there be a sudden increase in demand, the buffer stock manager will have to take strong action to keep the price down around the £830 a ton level.

The Laos situation is beginning to make itself felt in Singapore where the price is surging ahead and is equivalent to around £830 a ton c.i.f. Europe, which compares with the UK quotation of around £825 a ton—the highest level for over four years. The US market is becoming sensitive to the international situation and the price has risen to around $1.05 a pound.

Copper is without feature in London, but showing signs of life in New York. In London the market has fluctuated narrowly on reports of a continuance of the port strike in Chile which is holding up shipments of copper. This has not yet been recognized as a serious threat to the flow of copper supplies, but it may become so if copper shipments continue to be held up. Demand in London is still weak and no decisive price trend has emerged.

In the US, the intake price for scrap has been raised to 23¾ cents a pound at which level a fair amount of metal has changed hands. Some consumers are beginning to eye the outlook with a trifle more optimism and the market for electrolytic copper is said to be satisfactory. The US price structure is unchanged with 29 cents a pound covering the quotation for both custom smelters and producers.

Lead is quietly dull with price movements narrow in front of the communiqué from the Lead and Zinc Study Group meeting in Mexico City. Buyers and sellers are fairly evenly balanced and the LME quotation is not moving far either way from £67 a ton. In the US the market is quiet and the price unaltered at 11 cents a pound.

Zinc in London is weak. This is partly due to the tendency to wait and see what the outcome will be of the Lead and Zinc Study Group meeting, but partly, too, to the arrival of metal from the Continent. Warehouse stocks are rising and the outlok is only fair with the price reasonably steady around £84 a ton. In the US production continues to outrun consumption. Demand is routine but the quotation is still called 11½ cents a pound for East St. Louis spot metal.

"Industrial Maturity at 20"

The man on the shop floor must have a higher standard of training to-day than in past years, if industry is to flourish, said the Lord Mayor of Sheffield, Alderman Harold Slack, when he spoke at the annual prize and award distribution of the science department of Sheffield College of Technology at Sheffield City Memorial Hall on March 22. He said it was no good for a worker to reach "industrial maturity" in his 30s, he muct reach it in his 20s. No longer was it good enough for the ordinary worker to know how to use a file. He must have a much more detailed knowledge to get anywhere, said the Lord Mayor, and added that it was just as necessary for the managers and the men at the top to know what went on on the shop floor.

Census of Production for 1961

The Census of Production for 1961, to be taken next year, will be on similar lines to the census now being taken in respect of 1960, and will include firms engaged in mining and quarrying, manufacturing, and construction, states the Board of Trade. Returns will again be required only from a sample of businesses employing 25 or more persons, and not from those already supplying the board with monthly or quarterly figures of stock and capital expenditure.

Questions asked will relate only to sales and work done, capital expenditure, and stocks and work in progress. In the case of the construction industry, information about employment will be sought in place of sales and work done. Firms will also be required to give details of sales direct to the public, such as by mail order, to own employees, etc.

The periodicity of detailed Censuses of Production has been reviewed by the Board of Trade, which has concluded that census operations should be planned on the basis of a five-yearly interval between detailed Censuses of Production and between full and sample Censuses of Distribution. It is intended that the next detailed Census of Production should relate to the year 1963, to be followed by a sample Census of Distribution for 1966 and by a detailed Census of Production for 1968.

Qualcast Board to be Reorganized

Reorganization of the board of Qualcast, Limited, ironfounders and lawn-mower manufacturers, of Derby, will take effect on April 1, when the company will operate its main foundries at Derby as a sub-group under its own management board. Mr. A. J. Batterham, a departmental director and general manager of the Wolverhampton branch of the company will head the new sub-group.

Mr. V. Jobson, who is 74, and who has been with Qualcast for 56 years, will continue as chairman, with Mr. J. R. Fleming as vice-chairman. At present Mr. Fleming is also joint assistant managing director, specializing in production, but he is to retire at the end of the year, although he will remain a consultant director.

Mr. T. W. Cooper, joint assistant managing director, becomes sole managing director on April 1. The executive directors will be:—Mr. E. J. Appleby, in charge of financial and secretarial matters; Mr. H. Clarke, in charge of finished products; Mr. H. A. Redshaw, in charge of group foundries; and Mr. R. H. Harris (a new appointment to the parent board) in charge of castings sales.

Export Assistance Register

Results of the Institute of Director's questionnaire to its 36,000 members on setting up an Export Assistance Register were announced on Tuesday. More than 600 British exporting firms, including many of the biggest in the country, have offered to give general advice and help to non-competing firms wanting to export. A total of 523 have said they would welcome this kind of advice. Work is now in hand "marrying up" the names of the firms.

Mr. Roger Marlow, secretary of the institute's Export Action Now Committee, said that the response was remarkable and heartening. "We hope that the register will provide a unique service in the export drive."

FACTS AND FRICTION

Look at the construction of a FLEXHOISTA—6 strands each of 19 wires with an independent wire rope core, all perfectly assembled yet all working independently to give flexibility. They are continually subjected to both external and internal stresses and strains and to surface abrasion and pressure; these changes are taking place very rapidly when the rope is running. That is why it is so important to get the right rope for the job.

FLEXHOISTA is made by a Company with close on a century of experience and service in ropes.*

* For scheduled replacement, emergency or just honest advice about wire ropes—call in Whitecross any time.

Fit the rope fit for the job—*fit*

FLEXHOISTA

THE WHITECROSS CO. LTD.
WIRE ROPES
WARRINGTON ENGLAND
EST: 1864

Imports and Exports of Iron and Steel in January

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in January this year. Totals for January, 1960, are also included.

Total Exports of Iron and Steel

Destination.	Month ended January 31.		Month ended January 31.	
	1960.	1961.	1960.	1961.
	Tons.	Tons.	£	£
Malta	1,220	319	70,871	25,395
Sierra Leone	419	2,244	40,704	135,826
Ghana	2,108	1,833	107,154	104,729
Nigeria	6,186	11,315	416,211	605,774
Union of South Africa	7,013	5,474	600,457	495,061
South-West Africa	106	2,711	6,939	219,784
Rhodesia and Nyasaland	1,506	3,494	107,689	217,037
Tanganyika	652	2,647	47,467	143,388
Kenya	2,036	4,404	116,863	250,398
Uganda	161	420	12,881	44,624
Mauritius	305	239	15,492	16,771
Bahrein, Qatar, and Trucial States	162	1,502	13,955	114,247
Kuwait	120	697	19,530	71,478
India	15,132	20,039	1,009,009	1,289,395
Pakistan	7,725	4,232	265,610	257,541
Singapore	1,970	2,051	150,444	156,385
Malaya	1,431	2,463	99,234	186,182
Ceylon	4,995	2,675	264,214	175,317
British North Borneo	322	316	17,329	18,948
Hongkong	6,363	5,553	241,347	238,688
Australia	13,743	24,113	1,062,391	1,703,701
New Zealand	7,538	26,013	504,049	1,492,391
Canada	23,148	12,688	1,364,933	879,456
Jamaica	1,890	2,035	142,731	130,620
Trinidad	4,376	3,533	365,205	268,791
British Guiana	533	688	34,608	51,501
Other Commonwealth countries	1,866	1,818	126,959	128,339
Eire	4,283	7,309	276,419	441,738
Soviet Union	2,214	1,572	982,591	411,604
Finland	3,047	3,619	252,935	313,521
Sweden	24,068	16,808	1,258,798	1,094,042
Norway	12,766	9,925	705,843	583,934
Denmark	9,367	7,556	619,854	538,994
Poland	1,580	276	135,194	40,626
Western Germany	19,543	6,840	857,691	347,275
Eastern Germany	6,083	1,870	317,006	149,826
Netherlands	11,093	8,880	637,894	579,181
Belgium	4,658	610	261,598	73,231
France	369	1,269	49,843	147,261
Switzerland	1,289	2,028	149,122	218,742
Portugal	1,139	1,351	92,399	119,305
Spain	1,142	1,921	115,122	144,250
Italy	4,605	4,772	227,516	370,773
Austria	462	651	80,417	93,083
Yugoslavia	168	4,110	7,421	170,985
Greece	1,723	3,879	81,880	197,101
Turkey	183	2,045	14,528	166,438
Netherlands Antilles	836	51	38,864	4,610
Portuguese East Africa	556	229	33,470	16,256
Egypt	1,366	4,228	62,783	200,594
Libya	1,204	683	95,103	61,309
Sudan	454	1,270	33,575	98,528
Israel	3,287	3,011	165,154	174,337
Saudi Arabia	25	177	3,422	27,752
Iraq	3,232	12,806	236,975	926,653
Iran	7,476	2,210	467,267	170,120
Burma	90	245	6,359	19,318
Thailand	1,710	771	125,956	42,325
Indonesia	2,681	1,301	207,692	93,934
China	7,451	2,899	633,465	380,825
Japan	8,608	13,292	179,181	335,062
Philippine Republic	1,647	780	113,362	43,415
USA	30,672	7,476	1,961,209	533,407
Cuba	970	234	76,956	16,007
Mexico	562	146	49,882	35,692
Colombia	790	2,012	53,433	120,644
Venezuela	4,002	1,822	307,580	145,104
Ecuador	125	207	9,957	16,849
Peru	449	804	32,741	61,515
Chile	175	316	15,324	40,116
Brazil	2,439	426	178,102	37,861
Uruguay	840	274	62,616	18,979
Argentina	10,176	5,797	649,076	438,589
Other foreign countries	5,716	3,921	472,305	321,718
TOTAL	320,347	300,195	20,620,146	20,005,196

Total Imports of Iron and Steel

From	Month ended January 31.		Month ended January 31.	
	1960.	1961.	1960.	1961.
	Tons	Tons.	£	£
Union of South Africa	3,593	2,370	216,645	134,356
Rhodesia and Nyasaland	995	6,353	123,093	298,943
Canada	3,438	23,859	243,872	1,056,762
Other Commonwealth countries and Eire	4,306	5,124	228,255	187,605
Soviet Union	4,428	3,555	122,929	101,335
Sweden	2,810	4,296	391,509	625,929
Norway	8,785	11,655	560,804	633,954
Poland	86	141	4,815	19,746
Western Germany	14,536	6,036	1,012,016	426,986
Netherlands	16,008	7,165	1,057,434	455,335
Belgium	4,573	4,645	332,016	206,874
Luxembourg	645	2,959	35,926	123,890
France	4,036	2,847	341,187	280,955
Italy	1,060	154	72,946	37,494
Austria	583	302	50,900	39,205
Japan	424	1,032	41,248	184,841
USA	2,293	1,721	256,979	392,570
Other foreign countries	869	714	55,151	61,612
TOTAL	73,468	84,928	5,147,725	5,278,392
Iron and steel scrap and waste, fit only for the recovery of metal	5,899	1,625	94,384	36,028

Exports of Iron and Steel, by Product

Product.	Month ended January 31.		Month ended January 31.	
	1960.	1961.	1960.	1961.
	Tons.	Tons.	£	£
Pig-iron	25,747	7,703	483,240	162,889
Ferro-columbium (niobium)	14	5	20,340	9,023
Ferro-tungsten	107	85	45,621	34,988
Other ferro-alloys	676	294	129,747	67,753
Ingots, blooms, billets, slabs, steel bars (incl. tinplate bars), and similar primary forms	5,562	1,108	191,095	43,094
Pieces roughly shaped by forging	45	200	6,355	20,847
Iron bars, rods, angles, shapes, and sections	208	264	10,503	13,513
Steel bars, rods, angles, sections, and shapes	60,636	65,416	2,991,900	3,485,515
Iron plates and sheets	36	149	2,624	7,503
Universal plates	1,848	715	86,169	33,842
Steel plates, 3mm. and under 4.5mm. in thickness	2,436	2,955	148,912	166,414
Ditto, 4.5mm. or more in thickness	24,391	35,883	1,148,382	1,526,063
Blacksheets and blackplate	29,456	24,659	2,212,787	1,863,417
Hoop and strip	7,644	11,485	641,914	1,058,054
Tinplate	57,648	33,289	4,365,931	2,558,365
Decorated tinplate	244	573	20,699	44,453
Galvanized sheets	5,245	5,613	381,978	433,179
Other (incl. tinned sheets, terneplate, and ternesheets)	4,195	4,354	333,740	490,788
Railway and tramway construction material	8,654	23,745	453,020	1,092,240
Wire rods of steel (incl. alloy steel)	6,984	3,892	322,744	185,938
Wire	9,708	10,852	838,449	950,646
Tubes, pipes, and fittings	68,863	66,956	5,785,996	5,756,642
TOTAL	320,347	300,195	20,620,146	20,005,196

Baker Perkins Foundry Machinery at work in Wilmer Lea Foundries Limited

Illustrated is a Baker Perkins Rotary Table Shot Blast Machine working in Wilmer Lea Foundries Limited, London's largest Iron Founding Company. This modern and efficient machine includes our patented bi-phase impeller system with low power consumption. Special foundations are unnecessary. Why not write to us for full details of our Shot Blasting range?

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B.P.110

Current Prices of Iron, Steel, and Non-ferrous Metals

(Basis prices, delivered unless otherwise stated)

March 29, 1961

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over Middlesbrough, £21 17s. 0d.; Birmingham, £21 9s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P 10-ton lots or over, £23 5s. 0d., delivered Birmingham £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.; North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si less than 2 per cent, S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over; N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 9s. 0d.; Birmingham, £25 13s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(per ton unless otherwise stated, delivered)

Ferro-Silicon (6-ton lots and over).—45 per cent. Si, £45 0s. 0d. to £48 0s. 0d., scale 15s. 0d. per unit, lumpy. 75 per cent. Si, £62 0s. 0d. to £66 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s.10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 9s. 11d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 12s. 11d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £81 10s. 0d. to £84 10s. 0d., basis 60 per cent. Cr scale 27s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £79 0s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale, 27s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent. C,* 1s. 8d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 1s. 9½d to 2s. 0½d. per lb. Cr; 0.06 per cent. C,* 1s. 11d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free £275 0s. 0d.; 96/98 per cent., £285 0s.0d.

Ferro-columbium.—65/67 per cent. Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £58 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons and over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 100 tons and over, £32 5s. 6d.; hard (0.41 to 0.60 per cent. C), 50 tons and over, £33 17s. 0d.; silico-manganese, 50 tons and over, £42 16s. 6d.; free-cutting, 50 tons and over, £35 4s. 6d. SIEMENS MARTIN ACID (50 tons and over): Up to 0.25 per cent. C, £40 11s. 0d.; silico-manganese, £43 4s. 0d

Billets, Blooms, and Slabs for Forging and for Stamping (50 tons and over).—BASIC: Soft, up to 0.33 per cent. C, £37 0s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £38 2s. 6d.; acid, up to 0.25 per cent. C, £41 14s. 0d.

* Average 68-70 per cent.

FINISHED STEEL

Heavy Plates and Sections (50 tons and over).—Ship plate (N.-E. Coast), £40 7s. 0d.; boiler plates (N.-E. Coast), £42 17s. 0d.; floor plates (N.-E. Coast), £41 16s. 0d.; angles (N.-E. Coast), £38 1s. 6d.; joists (N.-E. Coast), £37 17s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 6d.; under 4 tons to 2 tons, £41 3s. 6d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £67 11s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £66 7s. 0d.; nickel-chrome, £97 1s. 0d.; nickel-chrome-molybdenum, £109 14s. 0d., in lots of 25 tons and over.

NON-FERROUS METALS

Copper.—Cash, £223 10s. 0d. to £223 15s. 0d.; three months, £225 0s. 0d. to £225 10s. 0d.; settlement, £223 15s. 0d.

Copper, Tubes, etc.—Solid-drawn tubes, 2s. 1¾d. per lb.; rods, 240s. 6d. per cwt. basis; 20 s.w.g., 275s. 6d. per cwt.

Tin.—Cash, £820 0s. 0d. to £820 10s. 0d.; three months, £824 10s. 0d. to £825 0s. 0d.; settlement, £820 10s. 0d.

Lead (Refined Pig).—Second half March, £64 15s. 0d. to £65 0s. 0d.; second half June, £66 5s. 0d. to £66 7s. 6d.; settlement, £65 5s. 0d.

Zinc.—Second half March, £82 5s. 0d. to £82 7s. 6d.; second half June, £82 2s. 6d. to £82 5s. 0d.; settlement, £82 7s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £122 12s. 6d.; rolled zinc (boiler plates), all English destinations, £120 17s. 6d.; zinc oxide (Red Seal); d/d buyers' premises, £97 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 9½d. per lb.; sheets to 10 w.g., 200s. 3d. per cwt.; wire, 2s. 8½d.; rolled metal, 200s. 3d. per cwt.

Brass (Brazing).—BS1400, B3, £177; B6, £224.

Brass (High Tensile).—BS1400, HTB1, £196; HTB2 £213; HTB3, £232.

Gunmetal.—BS1400, LG2, £221; LG3, £231; G1, 1%, £294; G1, ½%, £284.

Phosphor Bronze.—BS1400, PB1 (AID released), £311 BS1400, 90/10/1, £299.

Leaded Phosphor Bronze.—BS1400, LPB1, £242.

Phosphor Bronze Strip, etc.—Strip, 287s. 3d. per cwt.; wire, 4s. 1d per lb.; rods, 3s. 3¾d.; tubes, 3s. 3½d.; chill cast bars, solids 3s. 3½d.; cored 3s. 4½d. (CHARLES CLIFFORD, LIMITED).

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 10½d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 3½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 2½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 2½d. to 2s. 3d. per lb.; Antimony, English, 99 per cent., £210 0s. 0d. Quicksilver, ex-warehouse, £69 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £245; AB2, £253.

Translation Service

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this JOURNAL when doing so.

BISI 2030 A NEW NON-DESTRUCTIVE ELECTRO-MAGNETIC TESTING PROCEDURE. (From German.) HAVELKA, F. *Wissenschaftliche Z. der Hochschule für Schwermaschinenbau Magdeburg*, 1959, *3*, Dec., 189-193. (£2 15s.) The paper deals with a method, with the aid of which it is possible to measure quickly the wall thickness of ferromagnetic materials. It is immaterial whether the part to be measured is covered with scale, rust, etc. The method is based on the measurement of the phase displacement between the vector of the magnetic alternating field directly above the measuring point and between the vector of the magnetic flux which produced that field.

BISI 2032 DESIGN AND PERFORMANCE OF A NEW ULTRASONIC PROBE FOR THE EXAMINATION OF CAST-IRON PIPES. (From German.) Wehr, J. *Wissenschaftliche Zeitschrift der Hochschule für Schwermaschinenbau Magdeburg*, 1959, *3*, Dec., 207-214. (£5.) This paper delves more deeply than is customary in literature into the design of a special type of ultrasonic probe, which forms in a sense an extension of ultrasonic application.

BISI 2037 REMOVAL OF DUST FROM CONVERTER BROWN-SMOKE USING A WET ELECTROFILTER. (From German.) Guthmann, K. *Stahl Eisen*, 1960, *80*, Nov. 24, 1803-05. (£2.)

BISI 2039 TEMPERATURE MEASUREMENT IN STEEL MELTS WITH A NEW TYPE OF IMMERSION THERMOCOUPLE. (From German.) Meerkamp van Embden, H. J. *Giesserei*, 1960, *47*, June 16, 328-9. (£1 5s.) The thermocouple is made by drawing down to about 2 mm. a nickel-tube containing a Pt-Pt/Rh couple insulated with MgO. The instrument has a low-heat capacity, can be used again after cutting off the end, and is sufficiently flexible to be coiled. Some applications of the thermocouple are outlined. (*JISI* abstract 1960, Dec. 467/8.)

BISI 2056 RESISTANCE OF A BLAST-FURNACE CARBON-LINING TO ATTACK BY CERTAIN AGENTS. (From German.) Janowski, J., and E. Mazanek. *Neue Hütte*, 1960, *5*, Dec., 743-752. (£5 5s.)

Translations in course of preparation include:—

BISI 2092 CLEANING OF FUMES IN ARC FURNACES. (From French.) Septier, L. *Centre Doc. Sidér. Circ.*, 1958, *15*, (7), 1479-1486.

BISI 2093 MODERN ELECTRONIC WEIGHING. (From German.) Wiethoff, G. *Werkstatttstechnik*, 1960, *50*, Oct., 537-547.

BISI 2096 ACOUSTIC AND THERMAL RADIATION PROBLEMS. (From Italian.) Codegone, C. *ATTI della Academia delle Scienze di Torino*, 1954-55, LXXXIX, 66-7.

For the following translations, enquiries should be addressed to the Centre de Documentation Sidérurgique, 6, Rue de Lota, Paris 16, France, and I.R.S.I.D., 185, Rue President-Roosevelt, St. Germain-en-Laye, (S-et-O), France, respectively.

CDS I.T. 3211 INFLUENCE DE LA TENEUR EN GAZ SUR LA MICROSTRUCTURE DE LA FONTE DE MOULAGE. Adachi, A., K. Mizukawa, and K. Ochiai. *Imono*, 1960, *32*, (1), Jan., pp. 25-31.

IRSID T. 1500 ESSAIS DE PREPARATION ET DE RESISTANCE EN SERVICE DES BRIQUES REFRACTAIRES CONSTITUEES PAR DU GRAPHITE ET DE LA CHAMOTTE. Zegzhda, V. P. *Ogneuporu, URSS*. 1959, July, *24*, (7), pp. 335-339.

HANDLING FOR PROFIT is the theme of a one-day conference on materials handling, organized by the Willesden & Hendon Local Productivity Association, to be held on April 12 at the Willesden Technical College, Denzil Road, London, N.W.2. Further details may be obtained from Mr. G. R. Lutner, S. Smith & Sons (England), Limited, Waterloo Road, London, N.W.2.

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SITUATIONS WANTED

YOUNG FREELANCE REPRESENTATIVE with excellent high-level connections is willing to act as London and Home Counties agent for progressive pressure and gravity die-casting contractors. Box YF678, FOUNDRY TRADE JOURNAL.

TWO young energetic FOUNDRY EXECUTIVES require positions with expanding grey iron foundry. Both fully experienced in sales and commercial organisation. Exceptional contacts throughout all users of castings in British Isles. Box TY680, FOUNDRY TRADE JOURNAL.

GENERAL MANAGER seeks position. Twenty-four years senior position. Administration covers: customer contact, sales, estimating, quoting. Sound knowledge production control, bonus system, large and small castings. Sound metallurgical control, blackheart, whiteheart, grey iron steels and non-ferrous. Sand and gravity die casting. Used to large and small companies. Present salary £2,000. Car. Box GM676, FOUNDRY TRADE JOURNAL.

LANCASHIRE and CHESHIRE AGENT, many years' experience with general sales, own saloon car, will be pleased to hear from a manufacturer wishing to be represented on this area. Box LA663, FOUNDRY TRADE JOURNAL.

YOUNG FOUNDRY TECHNICIAN, City and Guilds Foundry and Patternmaking Certificates. Served metallurgical apprenticeship with Ferrous and Non-ferrous Foundries. Seeks interesting position with prospects. Box YF674, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

FOREMAN required for modern Iron and Steel Foundry in Midlands area. Good knowledge of mechanised production most essential. Reply stating age, previous experience and salary required. Box FR637, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required for Iron Foundry 20 miles West of London. Excellent prospects for practical man with experience of high grade quality castings, produced by machines, plate and floor methods. Candidate must be capable of accepting responsibility and direction of labour. Write giving full details and salary required to Box FF672, FOUNDRY TRADE JOURNAL.

REPRESENTATIVES. Salary of £1,000, rising to about £2,000, with car and expenses provided. Applications are invited from those with ambition to join expanding Sales Organisation. Successful applicant will be required to operate from Leeds and will be responsible direct to principal. Must have sound engineering background. Degree preferred, and possess current clean driving licence. Sales experience not essential. Age 30-40. Write details to Box RS640, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

TECHNICAL AND SALES REPRESENTATIVE required for Scotland and N.E. Coast for steel castings. Car provided, pension scheme. Apply in strict confidence, SALES DIRECTOR, Catton & Co., Ltd., 29, Chadwick Street, Leeds, 10.

CORE SHOP FOREMAN: An Assistant Core Shop Foreman is required for Foundry in the Wellington district. The position offers considerable scope to a young man in the early thirties, who has drive and initiative, to understudy existing Core Shop Foreman with the object of ultimately taking control over this department. Preference would be given to candidates who have a knowledge of Core-making Machines, but this is not essential. Some mechanical knowledge or experience as a Pattern Maker is of great importance. Applicants must give full details of experience in the first instance, together with salary required and an indication of when it would be convenient to attend for interview. Staff Superannuation Scheme; Canteen facilities. Box CS683, FOUNDRY TRADE JOURNAL.

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Required to take charge of a Semi-mechanised non-ferrous Foundry. Applicant must have practical and supervisory experience and be conversant with Core making, Blown and Shell cores, and sand blasting. This is a well paid staff appointment for the selected applicant.

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At least five years' experience in capacity of foreman, capable of working on own initiative, good administrator and disciplinarian. Five-night week, 7.30 p.m. to 6.30 a.m., weekly staff status. Salary £22.10s. per week inclusive of nightwork premium, plus production bonus. Contributory pension scheme after probationary period. Details of experience and position held to—

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Worsley Bridge Road,
Lower Sydenham,
London, S.E.26.

SITUATIONS VACANT—*contd.*

FOUNDRY FOREMAN required for Grey Iron Foundry situated near Wellington. Candidates must be fully experienced in making Hand-moulded Castings up to one ton in weight, and must be able to control small Mechanized Unit. Ability to increase output and maintain quality is essential. Applicants should be not less than 35 years of age and should give full details of experience and salary required; also state when it would be convenient to attend for interview. Staff Superannuation Scheme; Canteen facilities. Box FF682, FOUNDRY TRADE JOURNAL.

TECHNICAL REPRESENTATIVE (Castings) required for London and Home Counties north of the Thames. Experience in similar capacity, or foundry/mechanical engineering background necessary. Write to J. D. S. TOWNSHEND & CO. LTD., Founders' Representatives, 12, South Drive, Banstead, Surrey.

METALLURGIST required for large Grey Iron Foundry in the Wolverhampton area, producing castings up to 20 tons in weight for the machine tool and diesel engine industries. The successful applicant will have full control of cupolas and will be responsible for producing Grey Iron to all specifications. Applications in confidence with details of age, training, experience and salary required to: THE SECRETARY, Box MR662, FOUNDRY TRADE JOURNAL.

FOREMAN, age 35-45, required for Non-ferrous Foundry in Birmingham area producing high class valves and cocks. Must be fully experienced, enthusiastic and capable of organising and expanding output. Will be responsible for the complete operation from sand preparation to delivery of castings to stores. Staff position. Non-contributory Pension Scheme. Box FA686, FOUNDRY TRADE JOURNAL.

COMPANY of established Ironfounders in N.E. Midlands Area require a qualified TECHNICAL MAN in connection with an important extension of present capacity of 35 tons per week. Scope of duties will be wide, extending from Cupola melting to quality of finished castings. A young man is preferred, who can develop as the position expands. Box CO681, FOUNDRY TRADE JOURNAL.

ALUMINIUM Gravity Die Casting Foundry, 20 miles London, requires WORKING FOREMAN. Must be fully experienced in all Light Alloys, able to sample new dies and control labour. Good wages, non-contributory Staff Pension. Housing assistance if required. Apply: THE BUCKS DIE CASTING CO., LTD., Burnham, Bucks. Tel. 40.

AGENT, London Area, for grey iron, aluminium and non-ferrous castings and die casting, machining and fabrications in steel. Midland Foundry requires the services of a well connected person or firm to represent them on an Agency basis. Box AL688, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—contd.

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WANTED immediately for mechanized Factory at Watford, Herts, producing grey iron and some non-ferrous castings. Salary about £1,750 according to experience plus percentage of profits. Car provided. Housing available.

Write Box F.532, c/o Streets, 110 Old Broad Street, E.C.2.

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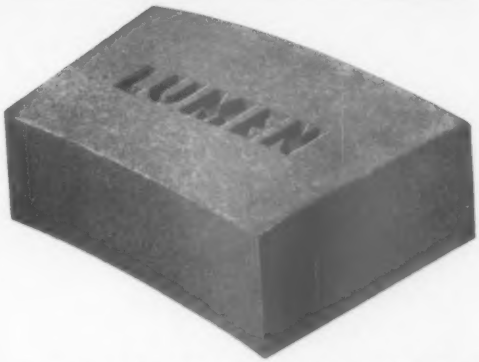

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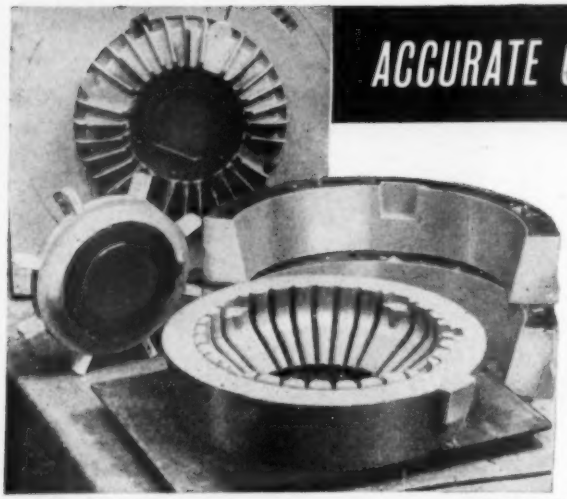

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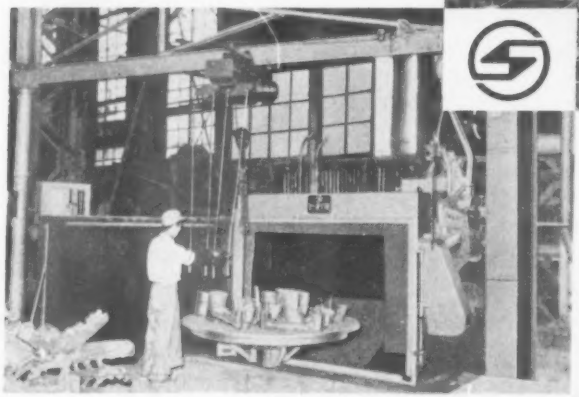

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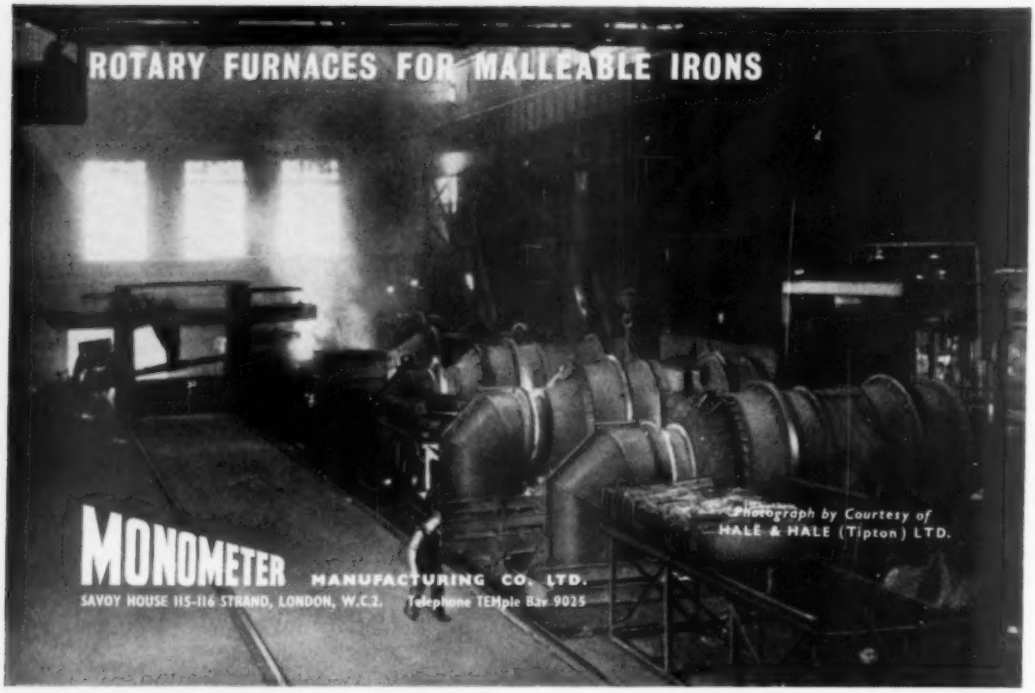
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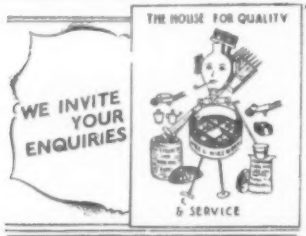

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